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SENATOR JAMES D. PHELAN

Whose paper on California petroleum will be a feature of the
Mining Congress Convention, November 13-16

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REPORTED DISCOVERY OF POTASH IN CUBA IS DOUBTED IN WASHINGTON

Formation in Antilles Does Not Favor Its Occurrence—Need for Thorough Prospecting of Favorable Areas in United States Emphasized—Drilling to Begin Again at Cliffside in the Near Future

While it cannot be said at this time that the reported discovery of potash in Cuba is entirely without foundation the Government's specialists interested in the matter are inclined to the opinion that no important deposit of potash exists in Cuba. The formation is not favorable for its occurrence and careful inquiry in Havana has failed to bring out any substantiation of the report.

It seems to be the consensus of opinion here that the deposits in Cuba probably are potash silicates in the volcanic breccia. They probably are soluble only in acid or after roasting. It is thought the percentage of potash is nowhere near as large as stated.

This alleged discovery has been given wide publicity and has turned public attention again to the work being done by the Geological Survey and the Bureau of Mines in an effort to locate potash deposits in this country. The drilling at Cliffside, which had to be suspended on account of insufficient funds, will be begun again in a few days it is expected.

HISTORY OF WORK

As to drilling by the U. S. Geological Survey for potash near Cliffside, Texas, Director Smith, of the Survey, says:

"Late in the summer of 1915, after several holes had been bored in the Smoke Creek Desert of Nevada, it was concluded that tests should next be made in the Red Beds region of the Southwest where, for two seasons, geologic investigations had been made of the stratigraphy and evidence as to conditions of deposition of the Red Beds, particularly as to the centers of greatest precipitation of gypsum, salt, and other deposits as the result of evaporation of shallow basins of the inland sea. It is believed that, at present, the most promising locations for boring in the search for such

potash deposits lie somewhere in the Red Beds basins of west Texas, eastern New Mexico, and western Oklahoma. Of course, it can not be definitely predicted, in advance of actual boring, whether in these basins the evaporation was so complete as to force the precipitation of the potash salts as well as the gypsum and rock salt or whether, if the potash was precipitated, it will not be found so diffused and held in clay sediments as to render its extraction impracticable.

"Particularly on account of the traces of potash found by Prof. J. A. Udden, of the State Bureau of Economic Geology and Technology, near Boden, Texas, and at two other localities in the northern part of the State, Cliffside was chosen for the test and the Survey outfit was shipped thither from Nevada. All available funds, which could legally be allotted to the work, were so directed but, on account of unexpected difficulties in securing water supply for the use of the drill and camp and of accidents, such as are incidental to boring in the Red Beds, it was found impossible to carry the hole beyond a depth of about 370 feet before the near exhaustion of the funds compelled suspension of the work very early in the spring.

MONEY INSUFFICIENT

"Now that the new appropriation is available, the matter has already been taken up again but, on account of the small amount of funds available for drilling, I am in despair as to being able to drill to the depth required for complete test at this point. The total amount added by Congress to the appropriation for chemical and physical researches for this special search for potash is but \$20,000. With this money the Geological Survey is obliged to carry the cost of field investiga-

tions of reported discoveries of potash in different parts of the country, to carry on correspondence and to test samples sent in by prospectors, farmers, engineers, and citizens in different States, as well as by its own geologists, for tests in the Survey laboratories. In cases where the samples show appreciable amounts of potash, detailed information as to location and conditions of occurrence is solicited by correspondence in order that, if these data and the results of the tests are sufficiently encouraging, geologists may visit the deposits, investigate the source of the salts and pass upon the prospects as to quantity, official samples being, of course, taken for chemical analysis, which may be made public by the Survey. Samples from wells drilled in salt-bearing formations for purposes of irrigation or in exploration for oil or salt deposits have been collected and subjected to analysis in the Survey laboratories.

"Further, the inquiries presented by chemical engineers as to the distribution and potash contents of certain types of siliceous rocks in different parts of the country have been given some attention. In this connection, careful sampling has been made, for chemical analyses, of the green sand deposits in New Jersey, Delaware, Maryland, Tennessee, and North Carolina, in order that reliable information, as to the extent and accessibility of the deposits and, in particular, as to the potash contents, may be made available, the earlier analyses current in the reports being, in many cases, very erroneous as to the percentage of potash present in the samples. Also, the sericite deposits of the Georgia-Carolina region have been sampled in the field in order that information might be gathered as to the extent of the deposits as well as to the amount of potash carried by the sericite in different localities.

CLAY TAKES UP POTASH.

"In general, the exploration by the drill in the deposits of the old evaporated lakes in the Great Basin region, on account of the dissemination of the potash in the clays, has proved disappointing though the explorations have contributed materially to the development of potash brines, which are now yielding potash on a small scale at Searles Lake and at several points in Nebraska, as well as of the alunite deposits near Marysvale in Utah.

"At Cliffside, the Survey has a rotary rig of special design, which is capable of drilling to a depth of 2,000 feet. A large amount of casing and some new tools are necessary to carry the hole to a depth of 2,000 feet or more if the drilling is done by the Survey with its own equipment, as has, in Nevada and California, been found much less expensive than drilling by contract. The cost of the casing must be deducted from the funds available for drilling. Accordingly, the prospect of being able to drill the hole to the entire depth—about 2,300 feet—to which it should be drilled to

make a complete test, during the current fiscal year, is not very good.

"During the work about to be begun again a chemist will be detailed to test the cuttings from each screw and the water used in drilling or brought up by the bailer at any time. Such scientific observation on the ground is essential to the determination both of the thickness of the beds, which may be found to contain potash in important amounts, and the richness of the salts or sediments at any given level.

"In portions of the Red Beds region, occasional drilling is done in the exploration for oil and, in these cases, it is the Survey policy to get in touch with the driller and bespeak his good offices and cooperation through forwarding samples of the rock cut in the vicinity of salt and gypsum beds and samples of the brines, for testing. Obviously, if the Survey is not given money sufficient to drill a single satisfactory test, it must utilize every opportunity to secure information that may be gained from holes drilled in other regions where saline deposits may be encountered, though the locations of these may not, from the standpoint of the history of the deposition of the Red Beds series, be especially favorable.

THE PROSPECTS

"As to the likelihood of the occurrence of beds of potash salts deeply buried in the basins of the Red Beds region, nothing definite can be stated, but the facts, (a) that the deposition of the Red Beds series was attended by excessive aridity at different times; (b) that great thicknesses of gypsum, rock salt, and anhydrite are known to be present in certain areas of the Red Beds country, as revealed by logs of oil or water wells or in outcrops; (c) that the depositional conditions appear to have included shallow evaporation basins of restricted extent, presumably distributed throughout portions of the area; (d) that the shales, sandstones, thin limestones, etc., of the Red Beds series are similar in general character, were laid down contemporaneously, and similarly certain interbedded salts and other precipitates, comparable to the principal potash-bearing basins in Germany; all point toward the conclusion that the chances for finding beds of potash buried somewhere in the Red Beds basins are probably better than in any other region of the country. The further fact that traces of potash are reported by Professor Udden to have been found at several points in north Texas is encouraging, though, after all, it may be either that the potash is not present in commercial quantities anywhere in the region or that the potash salts, which will probably be lenticular in their occurrence, are so restricted in their distribution that a considerable number of wells may be drilled at carefully chosen localities without encountering one of the lenses. Let me add in this connection that the first traces of potash de-

posits found in north Texas, namely, the samples from the Spurr well in Dickens County, were discovered by Professor Udden while gathering well logs and samples in the Red Beds region under the auspices of this Survey.

"I have explained, at considerable length, the drill situation confronting the Survey. The country needs potash desperately and the Geological Survey will do the best that it is able, with the small amount of money available, to find potash deposits. It will, I trust, be possible to bore at least to a depth of 2,000 feet, which will exceed the depth at which the more important traces of potash are believed to have been found.

A MATTER OF BORING

"In conclusion, I would like to emphasize that the exploration conducted by the Geological Survey is now generally conceded to have developed chiefly into a matter of boring and that the rate of progress in this type of work, taken with the necessity for many chemical analyses and keeping watch of minor developments in the country, becomes almost impracticable with the small appropriation that has heretofore been made for the Survey potash work. It would cost no more in the end to expedite these practical tests with the drill by providing sufficient funds for energetic prosecution of the exploration work and, as a matter of fact, the scientific supervision of the investigation on the larger scale would cost no more than at the present halting rate of progress. With the present appropriation of \$20,000, the Survey can not conduct its potash work on a business-like basis."

Cost of Coal to be Discussed.

A paper on "The Cost of Coal" by George Otis Smith and C. E. Leshar of the United States Geological Survey is certain to excite considerable interest when it is read by Dr. Smith at the convention of the American Mining Congress in Chicago next month. It is understood that it is the purpose of the authors to present the general facts and analyse the actual cost of coal both anthracite and bituminous. Dr. Smith is said not to be afraid of public operation if it should mean cheaper coal, but he thinks the facts need to be analysed very carefully before many can be convinced that the private operation of coal mines are so wasteful or inefficient as to justify government operation.

Maps Oatman District.

Owing to the increasing importance of the Oatman-Gold Roads mining district the United States Geological Survey has undertaken the topographic mapping of that region. In the near future a geological survey of the district is contemplated.

IRON PYRITE PRODUCTION

BREAKS ALL RECORDS

The domestic production of pyrite in 1915 attained a new high level, due chiefly to the unprecedented demand for the ore in making sulphuric acid, says a Geological Survey report. The production was 394,124 long tons, valued at \$1,674,933, an increase of 52,462 tons in quantity and of \$391,587 in value, compared with 1914. The consumption of ore—that is, the combined domestic production (394,124 tons) and imports (964,634 tons)—was 1,358,758, a decrease of 4,521 tons, compared with 1914. This was caused by the falling off in imports. The general resumption of activity at acid plants especially created a great demand for both foreign and domestic pyrite, and the imports, particularly of European pyrite, would have been larger if suitable vessels had been available for the carrying trade.

Virginia, as usual, ranked first among the States in both output and value of pyrite in 1915, there being marketed 145,050 long tons of pyrite, valued at \$729,644, an increase of 3,774 tons in quantity and of \$173,553 in value. The great increase in value was due to the demand for the pyrite for use in making acid, a demand which greatly increased toward the end of the year and continued in 1916.

The pyrite came from the Arminius mine, of the Arminius Chemical Co.; the mine of the Sulphur Mining & Railroad Co., and the Boyd-Smith mine, all near Mineral, Louisa County; from the Gossan mine, of the General Chemical Co., at Monarat, Carroll County; and from the Bertha Mineral Co., Austinville, Wythe County. The Cabin Branch Mining Co., which heretofore has been an important producer of pyrite at Dumfries, Prince William County, reported no output in 1915.

COAL SHIPMENTS GAIN 10

PER CENT OVER LAST YEAR

August, 1916, showed an increase in shipments of bituminous coal of 10 per cent over August, 1915, and of 13 per cent over July, 1916. The corresponding increases in beehive coke shipments were 9.5 per cent and 9 per cent, according to the U. S. Geological Survey.

DR. PARSONS TO VISIT

EUROPEAN NITRATE PLANTS

Dr. Charles L. Parsons, head of the division of mineral technology of the Bureau of Mines, will sail from New York, October 6, en route to several European countries, where he will make an investigation of nitrate plants. His report is expected to have an important bearing on the method of nitrate manufacture which will be adopted by the United States Government.

GOVERNMENT EXPERTS WELL KNOWN TO MINING MEN

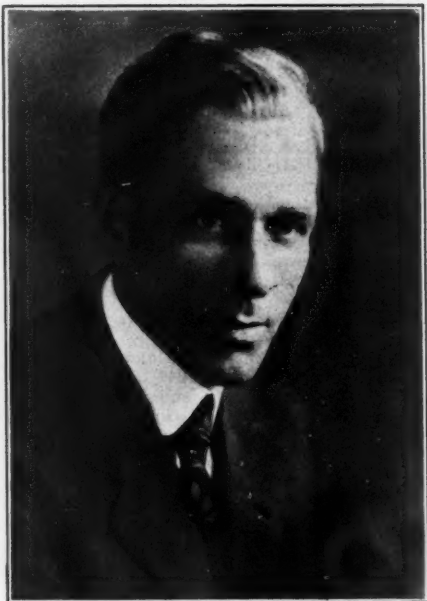


Photo by Harris & Ewing.

EUGENE W. SHAW
Geologist

Eugene Wesley Shaw, who was born in Delaware, Ohio, July 29, 1881, was a farmer's son, one of three brothers, each of whom became scientists, the other two being a botanist and a chemist. Following his graduation from the Delaware High School he attended the Ohio Wesleyan University from which institution he was graduated with the degree of Bachelor of Science and a Magna cum Laude in geology. Thence he went as a fellow to the University of Chicago, where he did some post graduate work in geology. During his term as a student in these universities he took advantage of opportunities offered to do tutoring in various lines, including geology, bird study and botany. However, ever since he ran away from home to hunt fool's gold, Mr. Shaw seems to have had no doubt but that his life work was to be geology.

In 1907 Mr. Shaw cast his lot with the U. S. Geological Survey. His first assignment was on coal and gravel deposits in central Wyoming. His next work was on areal geology in western Pennsylvania, and in connection with this work a new hypothesis for

the origin of the remarkable high terraces of the region was formulated.

In following years Mr. Shaw surveyed all or parts of 20 quadrangles in Illinois and prepared folios on them. In connection with work in this State, and in Missouri, and Kentucky, he discovered a chain of recently extinct lakes almost as extensive as the Great Lakes. He also examined the lead and zinc areas in northwestern Illinois and the Carlyle and Sandoval oil fields. In 1912 he began a study of the Mississippi delta, particularly of the curious upheavals at the mouths of the river, known as Mud Lumps. For purposes of comparison he visited the deltas of certain rivers in Europe, Asia and Africa. To ascertain the nature of the submarine portions of the Mississippi delta and the character of other off-shore deposits, the services of the U. S. Bureau of Fisheries steamer Fish Hawk were obtained and Mr. Shaw conducted an expedition for the collection of sea-bottom sediments along the Gulf coast from Galveston to Key West and along the Atlantic coast from Key West to Charleston.

Mr. Shaw's recent undertakings have been a study of the Florida keys, a part of this work having been done with diving apparatus, an investigation of the gas resources of northern Texas, and an examination of the petroleum fields of Mexico. He is now preparing a report on the surface geology of Mississippi and will next undertake a general survey of oil and gas fields of the southern Appalachians.

SOUTH AMERICAN PLATINUM INFLUENCING WORLD MARKET

While specialists at the Geological Survey are not able to explain from first-hand knowledge the exact causes of the decided fall in the price of platinum, they are in possession of some facts which doubtless have a bearing on this slump in prices. The production of platinum in South America has greatly exceeded the estimates of two years ago. This doubtless has had an important bearing on platinum prices. It also is regarded that it contributes to the tendency of prices to fluctuate violently, as the South American production is erratic.

Another cause of the decreased prices doubtless is the development of numerous substitutes for platinum and the fact that they are proving successful. This is especially true as applied to the dental trade. The use of platinum in the arts in many cases has tended to be a fad and its scarcity and increased price have resulted in greatly decreasing the quantities being thus used.

So far as can be learned here very little of the Russian supply of platinum is reaching the United States. What Russian platinum is being exported is going to the Allies and considerable care is being exercised that none of it reaches neutral countries.

GOVERNMENT OFFICIALS AND SPECIALISTS WILL ATTEND MINING CONVENTION

Prominent Men Interested in the Mining Industry Will Gather at Chicago November 13 in Answer to the Call of the American Mining Congress — Big Questions Confronting Industry to be Discussed

Prominent representatives of the Government will attend the nineteenth annual convention of the American Mining Congress which opens at Hotel La Salle, Chicago, November 13. There is also the hope that both the Secretary of the Interior, Mr. Lane, and Secretary of Labor Wilson will be present and take part in the important discussions. Van H. Manning, Director of the U. S. Bureau of Mines, will deliver an address on "The Past and the Future of Mine Safety Work." This will emphasize the tremendous advance already made through the efforts of the Congress and the Bureau, in the way of safety methods, and outline the greater needs of the future.

Geo. Otis Smith, Director of the U. S. Geological Survey will be present and read an important paper.

W. S. Gifford, executive director of the U. S. Commission on Industrial Preparedness, will deliver what promises to be a notable address at the coming convention, on "Efficiency in the Handling of Productive Forces."

Chairman E. T. Hurley, of the Federal Trade Commission, will speak on "The Work of the Commission and the Mining Industry."

In all of the "Sectional" meetings the experts will be present to advise. Dr. F. G. Cottrell's address on "The New Things in Science" will be one of the most comprehensive resumés ever given on the accomplishments of the past few years. C. E. Siebenthal, of the U. S. Geological Survey, is also one of the well-known Government experts who has promised to attend.

Dorsey A. Lyon, oil flotation expert will talk on that topic.

REVISION OF LAWS

The convention will endeavor to formulate definitely the long-sought-for and long-fought-for revision of the mining laws of the country.

Dr. Foster, of Illinois, chairman of the House Committee on Mines and Mining, will be in attendance and will report on the actual progress made on this subject by Congress, giving the objections raised to many of the contemplate changes, and his ideas as to what can be passed through both houses of Congress.

The battle promises to be a long and hard one, but the American Mining Congress has a record of successes that mark it a great



GOV. DUNNE, OF ILLINOIS

Who has done much to insure the success of the Mining Congress Convention

power for remedial good in the mining field east and west.

The first appeal made by the American Mining Congress for a Bureau of Mines was backed by less than one-twelfth of the members of the House of Representatives. But on May 16, 1910, the bill was signed by the President, and on February 25, 1913, an amended bill was signed covering more particularly the Western situation.

Since that time the efforts of the American Mining Congress have been directed, in part, to securing adequate appropriations for the work of the Bureau. This struggle has been no easy one but on the whole has been extremely satisfactory as Congress is now pledged to furnish the Bureau \$1,500,000 annually for the next three years.

The greatest work of the American Mining Congress is, however, along the lines of planning legislation which provides greater safety for the lives of the men engaged in coal and metal mining operations. The re-

sults of legislation initiated by the American Mining Congress has reduced by nearly one-half of the number of men killed per million tons of coal produced. Acting on the humanitarian impulse created by this movement of the American Mining Congress, the big organizations of the country have almost without an exception introduced the splendid "Safety First" efforts which have been so productive of good results everywhere.

The American Mining Congress has secured the adoption of laws by many States East and West making misrepresentation of mining stocks a misdemeanor.

It has prepared comprehensive laws for the use of electricity in mines. That which applies to coal mining operations has been adopted as a whole by the State of Pennsylvania and has been considered by other States. Its model law for the creation of mine drainage districts, its work for substantial aids to State Mining Schools, its protests against Federal interference with water power, its comprehensive investigation of mine taxation, are but a few of the things which the American Mining Congress has accomplished.

TO DISCUSS OIL PROBLEMS

The general meetings are to be held in the mornings, and the sections devoted to oil, coal, lead and zinc, copper, and precious metals, are to meet every afternoon in their own assembly rooms at the hotel. One of the special questions in the oil section will be that relating to the rights of the Western oil claimants upon lands withdrawn from entry and upon which large development has been made.

But there will also unquestionably be an emphatic protest against the policies of the Government in the proposed creation of naval oil reserves, and more particularly against the policies which work gross injustice to oil claimants who located their claims and carried on development work under the provisions then existing legislative conditions.

The convention promises to be epoch-making in more respects than attendance.

The programs for the general meetings and those for the "sectional" gatherings under "Zinc and Lead," "Precious Metals," "Coal and Oil" have now been supplemented by three meetings of copper men.

An assembly hall in hotel La Salle has been set apart for this section, and its first meeting will take place Tuesday, November 14, at 2 p. m.

This will be presided over by Hon. Wm. A. Clark. The principal addresses for the first session will be on "The Copper Resources of the United States," by Walter Harvey Reed, of New York; "The Future of Copper" by Thomas F. Cole, of Duluth, Minn., and one on the "Relation of American Copper Supply to Industrial Development" by a speaker of prominence in this industry.

On Wednesday afternoon in this section

the address on "Copper in its Relation to Preparedness" will be by Mr. C. F. Kelley, Mr. R. C. Gemmell, of Salt Lake City, is to have an address on the question "Should the Export of Copper at Production Cost Prices be Discouraged?"

Another address of the day will be on "Copper in its Relation to Industrial Efficiency."

On Thursday in this section Dr. L. D. Ricketts will preside. The principal address of the day will be on the question "Should Combinations be Fostered to Command for Export of Copper a Price Commensurate with its Actual Value in Commercial Development?" Every effort is being made to have John D. Ryan, of New York, talk on this topic. Another address of the day by an expert is on the subject "Relation of the Federal Government to Copper Export."

George Otis Smith and C. E. Leshner, the Director and Statistician of the Geological Survey respectively, will prepare a paper for the convention on "The Cost of Coal." Mr. Smith will present the paper.

Dr. Henry Mace Payne, a mining engineer with a large experience in Alaskan and Siberian mining, is to give a lecture illustrated with pictures of the frozen gravels of the North. Dr. Payne was employed by the Russian Government to inaugurate the plan of coal mining developed by him in Alaska.

E. L. Doheny, an oil operator of Los Angeles, is to give an illustrated lecture on the famous Cerro-Azul gusher in Mexico.

Otto Ruhl, a statistician of the Joplin lead and zinc district, will read a paper on "A Tariff for Revenue as Related to a Compensating Duty on Lead and Zinc Ores."

W. A. Williams, of the U. S. Bureau of Mines, will give a lecture on "Oil Resources of the United States."

Judge J. G. Gamble, of Des Moines, will read a paper on taxation of coal mines.

S. A. Taylor, of Pittsburgh, a mining engineer and coal operator, former president of the American Mining Congress, will give his report on "Uniform Cost Accounting." The discussion which will follow the presentation of this important question bids fair to be very interesting.

H. G. James, of the Independent Oil Producers' Association, will talk upon the necessity of a Federal Oil Bureau.

Dr. W. P. Whitney, scientific investigator for the General Electric Company, will prepare a paper dealing with the attitude of the American toward scientific research.

J. C. McDowell, of Pittsburgh, will read a paper on the relation of geology to the oil industry.

Hennen Jennings, a nationally known mining engineer now living in Washington, is preparing a paper on "The Accomplishment of Invention and Its Relation to the Mining Industry."

STATE GEOLOGISTS JOIN IN FIELD EXCURSION THROUGH NEW YORK STATE

**Director Smith and Chief Geologist White of United States Geological Survey make
Trip with Representatives of Many State Surveys—New York's
New Museum Comes in for Praise**

One of the most successful annual field excursions made by the State Geologists was that which took place last month. The attendance was representative and some very interesting inspections were made.

George Otis Smith, director of the United States Geological Survey, and David White, chief geologist, went on this field excursion. Director Smith was very much impressed with the new state museum of New York. Through the kindness of State Geologist Clarke an opportunity was given to inspect the museum fully. With reference to this visit Director Smith said:

"While New York is not one of the richest mining states, it possesses large mineral wealth. The mining industry there is fortunate in having this phase of the state's resources so fully displayed by exhibits in the economic geology section of the museum. Indeed every citizen of New York is fortunate in having available so splendid an educational display in the preparation and maintenance of which the highest scientific talent has been utilized, judging from the results.

"It is hard to conceive of a better small museum. In my opinion the State museum is large enough to serve its functions as an important adjunct to the educational system of the State."

The object of the excursion was the examination and comparison of some of the typical exposures of earlier Paleozoic formations. Another purpose was to study the structure and origin of the Lake Champlain basin and to observe the occurrence of the great bodies of magnetite ore in the region. The methods of mining, concentration and preparation for the market also were observed.

Some attention was given by the geologists to the marine shell bearing Champlain clays and the terrace evidence of the former levels of the sea during Pleistocene times.

Among the participants in the excursion, which was under the able guidance of Dr. Clarke and his associates, Dr. Rudolf Ruedemann and Mr. Hartnale, were: Prof. William North Rice, of Wesleyan University, Middletown, Conn., and a member of the State Geological Commission; Dr. I. C. White, State Geologist, of West Virginia; Prof. Geo. H. Perkins, State Geologist, of Vermont; Prof. W. O. Hotchkiss, State Geologist, of Wisconsin; F. W. DeWolf, State Geologist, of

Illinois; Dr. C. W. Shannon, State Geologist, of Oklahoma; Prof. H. L. Fairchild, of the University of Rochester; Dr. Geo. Otis Smith, Director of the U. S. Geological Survey; David White, Chief Geologist of the United States Geological Survey; E. O. Ulrich, Geologist, U. S. Geological Survey; Dr. Joseph Hyde Pratt, State Geologist, of North Carolina; Dr. E. H. Sellers, State Geologist, of Florida; Prof. H. F. Cleland, of Williamstown College; Dr. J. A. Bownocker, Director of the Geological Survey of Ohio and Prof. Geo. H. Hudson, of Plattsburg, N. Y.

Reports Cover Nevada Camps

Up to the year 1908 the work of the Geological Survey in Nevada had consisted of regional geologic reconnaissance, the detailed study of certain important mining districts, and the reconnaissance of a few of the less productive or less active districts, the work last named being incidental to other investigations. During that year a beginning was made in an effort to obtain some first-hand knowledge of the geologic relations of the ores in virtually all the mining districts of Nevada. One object of this work was to gather material which might subsequently be used in a general summary report on the geology and ore deposits of the State. Another was to procure and disseminate information concerning the less known and to a large extent undeveloped and comparatively inaccessible districts. In pursuance of this plan a number of reconnaissance reports have been published.

GEOLOGISTS TO DISCUSS

PETROLEUM AT NEXT MEETING

In keeping with the tremendous interest aroused on the part of the public through the increasing dependence for its welfare and daily comfort on the petroleum industry, the officers of the Geological Society of America are planning to include in their program, for a meeting to be held at Albany next Christmas week, a symposium on petroleum in which the original conditions of occurrence, composition, the geographic description of deposits and latent supplies of petroleum will be discussed by a number of the foremost geological authorities of the various bodies.

GATHERS INFORMATION AS TO IRON AND STEEL IN TEXAS

Col. L. P. Featherstone, of Beaumont and Longview, Texas, called at the Geological Survey recently to gather information as to the iron and steel making resources of Texas. Col. Featherstone holds large interests in the brown iron ore section of northeastern Texas and has offered to donate to the United States Government 1,000,000 tons of iron ore provided the proposed armor plate plant is established at Beaumont. The advantages of Beaumont have been presented to Secretary Daniels in the course of hearings in the matter of selecting a site for the armor plate plant.

A year ago Col. Featherstone was more particularly interested in the establishment of the armor plate plant at Port Bolivar, but since the recent storm and tidal wave that plant has been abandoned. At a point as far inland as Beaumont the danger to such an important plant from gulf storms would not exist, he points out.

GEOLOGICAL STRUCTURE OF COAL BEDS IN KENTUCKY IS MAPPED

A report on the coals of the western Kentucky fields bordering on the Ohio River in the Shawneetown quadrangle, by Wallace Lee, has just come from the press of the Kentucky Geological Survey. The area which has been done cooperatively by the State and Federal Geological Surveys contains the high rank coals of western Kentucky. A description of the coal beds, thirteen in number, are covered by sections and analysis. Most of the latter are being made by the Bureau of Mines.

Notwithstanding the extent to which the coal area is masked by thick alluvial deposits, the author of the report has very cleverly succeeded in mapping the geological structure which is somewhat faulted. As a whole the structure is regarded by him as rather unfavorable for the occurrence of oil and gas in commercial amounts.

TO WORK FOR INCREASED CIRCULATION OF REPORTS.

In order to secure a larger circulation of the publications of the Geological Survey, R. C. Shelse has been made the head of a new division of distribution. This appointment is made with the definite purpose of carrying out even further the policy of getting Survey publications into the hands of those who need them and those who will make the most use of them. In this side of the work of a scientific bureau it is recognized that it is especially necessary for the best of business methods to be used to give the public the prompt service which it desires and deserves.

LOUISIANA AND TEXAS PRODUCE 98 PER CENT OF COUNTRY'S SULPHUR

Sulphur was produced in 1915 in Louisiana, Texas, Nevada, and Wyoming. The production in the two Western States was small, amounting to only slightly more than 1 per cent of the total output of the country. Thus more than 98 per cent came from the Union Sulphur Co., in Louisiana, and the Freeport Sulphur Co., in Texas. To avoid revealing confidential reports of output of these companies the figures for sulphur will not be tabulated, as they have heretofore been, says W. C. Phalen, in his Geological Survey report, which just has been issued. They will be published in the table of mineral production of the United States and in the totals for the two States named, lumped, however, with other commodities, so that the value as sulphur will not be shown.

Though 1915 was a prosperous year in the sulphur industry, the output was not so great as in 1914. During the early part of the year business was somewhat dull, but it improved gradually as the year advanced. Slack conditions in the paper trade account in part for the falling off. The export trade in sulphur, as will be noted from a later statement in this report, was the lowest in some years, in spite of the partial paralysis of the sulphur trade in Italy incidental to the war in Europe. European inquiries for American sulphur have come from as far away as Greece.

Though the imports of foreign pyrite were not so great in 1915 as in 1914, they amounted to 964,634 long tons. In spite of these large imports and of a domestic output of pyrite of 394,124 long tons (an increase as compared with 1914), there has been, especially late in 1915 and early in 1916, an increasing call for sulphur from which to make sulphuric acid, owing to the great expansion in certain branches of chemical industry, and to the fear that in some way foreign shipments of pyrite might be curtailed. The high price received for the acid has made the use of the comparatively high-priced sulphur possible, but the use of sulphur has also certain obvious advantages owing to its purity and to the consequent fact that it leaves little or no residue. It is possible that in the manufacture of the highest grades of acid sulphur will continue to be used.

ARGENTINE ENVOY INVESTIGATES PETROLEUM PRACTICES HERE

Domingo Nogues is investigating the oil industry of the United States for the government of Argentina. The Argentine government never has formed a definite petroleum policy and is anxious to take advantage of the experience in this country before attempting legislation in this regard.

MINERS APPRECIATIVE OF BUREAU OF MINES WORK, DIRECTOR MANNING FINDS

After Extended Trip in West Mr. Manning Finds Much to Encourage Him—Conducts Hearings in Northwest with View of Ascertaining Best Location for Mining Experiment Station.

That the mining industry is highly appreciative of the work being done in its behalf by the Bureau of Mines, is the firm belief of Van. H. Manning, director of the Bureau of Mines, who has just returned to Washington from an extensive trip through the mining sections of the country. Mr. Manning was sent primarily to the Northwest by the Secretary of the Interior to determine the respective qualifications of the various points applying for the mining experiment station to be located in that part of the country.

Previously Tucson, Ariz., and Fairbanks, Alaska, had been designated for the other two stations which were appropriated for by the last Congress. In the Northwest, however, a number of places were very anxious to secure this Government station. Such convincing arguments had been forwarded to the Secretary of the Interior by various places interested as to make necessary the personal visit from the Director of the Bureau. Mr. Manning was accompanied by F. G. Cottrell, the chief metallurgist of the Bureau; D. A. Lyon, who is to be superintendent of the Northwest station, and G. A. Hulett.

During this entire trip the director and his party were enthusiastically received by the mining men. They were entertained most generously at every point visited. So frequent and spontaneous were the assurances that the Bureau's work is being appreciated that the director has returned to Washington greatly encouraged and strongly of the belief that the obstacles, which have been in the way of the work of this Bureau, are greatly less than they were even a few years ago.

Mr. Manning made his first stop at Kansas City to visit the safety-first train. The next stop was at Golden, Colo., where the Bureau of Mines is being aided in its work by the Colorado School of Mines. The Salt Lake City station was then visited. In connection with the work of the Anaconda Smelter Commission, of which Mr. Manning is a member, a stop was made at Anaconda. While there careful note was taken of the many large operations that are being conducted by mining companies at that point and Butte.

From Butte, the director's party went to Spokane where a hearing was given those interested in having the Northwest experiment station located at that point. Hearings were held at other places in the following order: Wallace, Idaho; Moscow, Idaho; Pullman,

Wash.; Seattle, Wash.; Portland, Ore.; Corvallis, Baker City and Grants Pass, Oregon.

After a careful consideration of the testimony in connection with such observations as were made by the director and his technical assistants, a conclusion was reached as to the point at which the Northwest station should be located. These conclusions were sent to the Secretary of the Interior, but as the Secretary is engaged in the Mexican conference it has been impossible for him to consider the report. It is expected that he will approve the recommendation of Mr. Manning, but several weeks may elapse before he will be able to digest the information on which Mr. Manning's decision is based.

Announcement was made recently in some papers to the effect that Seattle had been selected for the mining experiment station. This announcement was in error as no decision has been reached in the matter.

After having conducted hearings in regard to the experiment station, Director Manning and his party visited the San Francisco office of the Bureau, which is devoting most of its time to petroleum investigations. A trip was made down the San Joaquin Valley with W. A. Williams, chief of the division of petroleum technology of the Bureau of Mines and W. R. Hamilton, a petroleum engineer of San Francisco. Mr. Manning made a personal visit to a large number of California oil fields including the naval reserve. From California Mr. Manning went to Tucson, the site of one of the new experiment stations, and from there returned directly to Washington. With regard to some features of the trip Mr. Manning made the following statement:

"On July 22 Secretary of the Interior Lane announced the location of two of the three mining experiment stations, and the three mine safety stations appropriated for at the last session of Congress. The first of these experimental stations is to be at Fairbanks, Alaska, the second at Tucson, Ariz., and the third at a point not announced, in the Pacific Northwest. The exact location of the last-named station was held in abeyance pending a personal investigation by myself into the claims of the applicants for this station.

"The safety stations or rescue cars were located by the Secretary at Butte, Mont.; Reno, Nev.; and Raton, N. Mex. The contract for these cars has been let and they will be delivered February 1, 1917. The per-

sonnel of these cars will be as follows: One mining engineer, one surgeon, one foreman miner, one first aid miner, one clerk and one cook.

"The sum of \$101,500 was appropriated for the three rescue cars, their operation and maintenance, and employment of the personnel.

"The act relating to the establishment of the experiment stations as approved March 3, 1915, provides for the establishment in the several important mining regions of the United States of ten mining experiment stations and seven mine safety stations, in addition to those already established. The act, however, provides that not more than three of the experiment stations and three of the rescue cars shall be provided for or established in one year. In other words, three stations and three cars are provided for during the current fiscal year and three each during the following years until the stations and cars are established.

"The law authorizing these stations provides for investigations with a view to improving conditions in mining, quarrying, metallurgical and other mineral industries, safeguarding employees and improving the mining conditions; thereby preventing unnecessary waste of life and resources. The locations of these stations comes at a time when the mining industry particularly needs them, and will be a great impetus to the industry in the development of processes, many of which are now under way. The mining industry in the West is enjoying unprecedented prosperity, employing more men and utilizing the low grade ores and deposits to the highest extent. I found that the abandoned dumps which were supposed to contain material not worth while to treat, are being worked over for their valuable ore content. Old mines are being reclaimed and many prospects heretofore abandoned as not being workable are being turned into substantial mines.

"I found a great deal of friendly and earnest rivalry between the different localities for these experiment and safety stations, and it has been a difficult problem for the Secretary to reach his conclusions as to the best locality for the stations. The location of these stations and cars has been given most careful consideration, and I hope that the locations will meet with the approval of the entire mining industry."

GOLD, SILVER, LEAD, ZINC AND COPPER CLOSELY RELATED

H. D. McCaskey, chief of the division of mineral resources of the U. S. Geological Survey, is the author of the following comment on the relationships of certain metals:

In the mining industry five metals are closely related in both the genesis and the geologic occurrence of their ores. They also hold together in mining and in metallurgical

treatment. They are gold, silver, copper, lead, and zinc. Of their ores some contain all five metals, many contain three or four, and few contain only one. Gold and silver, for instance, on the one hand, and lead and zinc, on the other, almost always stand in close genetic relations, and the ores of each two are usually mined together. Copper ores almost invariably produce some silver and gold as well as copper, and lead ores, with certain exceptions, produce notable supplies of silver. Zinc ores in the Western States contribute also to the silver production. In the same mines sometimes, and in the same mining district frequently, all five metals occur in commercial quantity.

This situation is recognized by the United States Geological Survey in its publication of the annual reports on the mineral resources of the country. Hence the general treatment of each of the five metals in the general reports and the grouping together of the related metals in the various mines reports descriptive of individual or geographically grouped States.

In measurements of ores, concentrates, and similar material the short ton of 2,000 pounds is used. The ore classification is necessarily arbitrary in part. An ore is generally understood to be worked at a profit for one or more metals. The complex nature of western ores, especially, and the graduations from one well-recognized class to another render essential some fixed measures for the terminology used. The dry or siliceous ores comprise gold and silver ores proper, as well as fluxing ores carrying considerable quantities of iron and manganese oxides and very small quantities of gold and silver, and also precious metal bearing ores carrying copper, lead, or zinc in quantities too low to classify them as copper, lead, zinc, or mixed ores. The copper ores include those carrying over 2½ per cent of copper, or even less in the cases of the great disseminated copper deposits of the West and of the copper ores of the Lake Superior region. In general, the lead ores are those containing over 4½ per cent of lead, and the zinc ores are those containing 25 per cent or more of zinc, both irrespective of their precious metal content; but some ores of lower grade in lead, and especially in zinc, are treated profitably for these metals, and of course they are then classified as lead or zinc ores, as the case may be. The mixed ores are combinations of the ones enumerated.

To Work in Nevada and Arizona.

In order to bring up-to-date certain work in the Wonder, Fairview, Rawhide and neighboring districts, F. C. Schrader of the Geological Survey, is in Nevada. He also will do work in Gila River County, Arizona. He will be away from Washington two months.

MOBILIZATION OF NATION'S INDUSTRIES PLAN OF NATIONAL RESEARCH COUNCIL

**Director Manning of Bureau of Mines Attends Important Meeting at Which Work
is Organized—Would Render U. S. Independent of Foreign
Sources of Supply in Case of War**

At its annual meeting in April the National Academy of Sciences volunteered to organize the scientific resources of educational and research institutions in the interest of national preparedness. This offer, which was immediately accepted by President Wilson, has led to the establishment of the National Research Council.

Public welfare and national security depend upon industrial progress and military efficiency; and these, in turn, result from practical applications of scientific knowledge. A superstructure, no matter how perfect, must have firm foundations and thus the development of our industries must go hand in hand with the advancement of knowledge through research.

The organizing committees will recommend to the National Research Council the following plan of procedure, approved by the Council of the National Academy, but open to such modification as the research council may deem desirable:

1. The preparation of a national census of equipment for research, of the men engaged in it, and of the lines of investigation pursued in cooperating Government bureaus, educational institutions, research foundations, and industrial research laboratories; this census to be prepared in harmony with any general plan adopted by the proposed Government Council of National Defense.

2. The preparation of reports by special committees, suggesting important research problems and favorable opportunities for research in various departments of science.

3. The promotion of cooperation in research with the object of securing increased efficiency; but with careful avoidance of any hampering control or interference with individual freedom and initiative.

4. Cooperation with educational institutions, by supporting their efforts to secure larger funds and more favorable conditions for the pursuit of research and the training of students in the methods and spirit of investigation.

5. Cooperation with research foundations and other agencies desiring to secure a more effective use of funds available for investigation.

6. The encouragement in cooperating laboratories of researches designed to strengthen the national defense and to render the United States independent of foreign sources of supply liable to be affected by war.

The Research Council follows the line of

an organization which has been very potential in the mobilization of Great Britain's resources. The same plan has been followed for many years in Germany and is given credit for the remarkable industrial preparedness of Germany at the outbreak of the war. A further evidence of the efficacy of this systematic organization is the manner in which the German nation has been able to live economically during the progress of hostilities.

It has not been many years since scientific men were not taken seriously by the workmen engaged in many American industries. Even some employers were very loathe to try out various scientific methods of operation. Even yet the rescue crews of the Bureau of Mines encounter some ill feeling when they attempt to supplant the old-fashioned methods of bringing men from mines after an accident. "The book miners are killing our men," a crowd of mine workers cried out a few years ago when the Bureau of Mines' team was given permission to go into a mine following an explosion. While this sentiment is changing rapidly there are many examples of this woeful lack of cooperation between science and industry. There have been important strides taken during the past ten years, but we are far behind Germany, England and France in this regard, it is pointed out.

In order to systematize the movement, the National Research Council has been doing splendid work. A meeting was held September 20 in New York in which further steps were taken to organize the movement. Van H. Manning, Director of the Bureau of Mines, who is a member of the Council, attended this session. As yet the latest plans of the council have not matured sufficiently to justify their discussion, so that the developments of the recent meeting are not being given out.

The executive committee of the Research Council consists of Dr. John J. Carty, Chief Engineer of the American Telephone and Telegraph Co.; Dr. Noyes; Gano Dunn of the J. C. White Engineering Corporation; Dr. Edwin G. Conklin, Professor of Zoology at Princeton University; Dr. Victor C. Vaughan, Director of Medical Research of the University of Michigan, and Dr. Michael I. Pupin, Professor of Electro Mechanics at Columbia University. Dr. Geo. E. Hale, in charge of the Mt. Wilson Solar Observatory, is ex officio chairman of the committee.

DEPTH OF BRISTOL ORE SOMEWHAT IN DOUBT

According to Whitehill, the Bristol district of Nevada was organized April 10, 1871, by Hardy, Hyatt, and Hall. The ore deposits of this region were known in the late sixties, as most of this region had been prospected shortly after the discovery of Pioche, which took place in 1863. A smelter was built at Bristol Well in the late seventies, and later, a 5-stamp mill at the same place. These observations are made by J. M. Hill of the United States Geological Survey after a visit to the region. Others of his observations follow:

In 1877 the Hillside Co., was organized to take over the properties of Mr. Steele, which included the Hillside mine and the well and smelter. At that time the incline on the Hillside fissure was 200 feet deep, and the vein was reported to be 5 to 8 feet wide, carrying ore which averaged \$100 a ton in silver and lead.

The Census report for 1880 says that at the Hillside and Day mines galena and cerusite ores in limestone were being mined.

For several years the Hillside and Bristol companies operated the Hillside and May Day deposits on the west side of the range. The Day (Jack Rabbit) mine in Lake Valley was operated independently. These properties and several others near Bristol were consolidated in 1911 by the Day-Bristol Consolidated Mining Co., which, in 1913, was operating the May Day and Gypsy mines and had leased the Inman, Tempest, and Hillside properties. The Day (Jack Rabbit) was idle, and it was reported that the lower workings were below the ore zone. This company at present holds 23 patented claims and 4 locations.

The production of the mines in the vicinity of Bristol previous to 1904 could not be learned, though undoubtedly many thousand dollars worth of silver, lead, and copper were recovered during the period from 1869 to 1904.

The bodies of oxidized copper and lead ores always occur above planes which would interfere with the downward circulation of waters. They usually occur above or south of the northward-dipping, eastward-trending fissures, and on the hanging-wall side of the northward-trending fissures. Most of the few bedded deposits exposed in various mines occur above shaly or dense siliceous beds which have prevented the downward movement of the waters. The deposits so far opened are with little question thought to have been formed by downward-moving waters and are probably the result of a long-continued process. The source of the metals is not clear, as no deposits of primary sulphides have been opened in the district. It may be that deposits of the original sulphides will be found at greater depths on the

fissures, but from all that is now known it seems as reasonable to suppose that the oxidized ores were derived from sulphide deposits that have been entirely removed.

Since the ore bodies now being mined were formed by downward-moving waters, it is of some interest to know to what depth they may be expected to continue. It is to be presumed that primary sulphide ores, if any, will not be present in large quantities above the ground-water level. As there are no springs in these mountains, it must be admitted that the water table is lower than the bottoms of any of the canyons. That it is probably considerably deeper than most of the canyons is evidenced by the dryness of the lower workings at the Jack Rabbit mine, which are at least 1,800 feet lower than the lowest workings of the Gypsy.

The possible continuation of the ores with depth is another serious question which can be answered only by development; yet it may be mentioned in this connection that below the 900-foot level in the vertical shaft at the Day mine there seems to have been no considerable mineralization, and that even on the 600-foot level long stretches of the fissure are barren of ore bodies, to judge from the stope maps.

SMALLER PLATINUM PRODUCTION IN RUSSIA IS PREDICTED

The British vice-consul at Ekaterinburg, Russia, reports that the outlook for platinum mining in the Urals would seem to foreshadow an even smaller production this year than in 1915. The abnormal scarcity of the mineral habitually brought in and sold by the small holders at Ekaterinburg has tended to make these people (remembering last year's rapid price fluctuations) very cautious, and most of them now prefer to pledge their mineral with the banks with the idea of waiting for higher prices. The prices ruling at present (June, 1916) are 67,500 rubles per pood (\$963 per pound at the normal exchange rate of \$0.515 to the ruble) for quantities up to 10 pounds. Larger quantities—1 pood (36.11 pounds) and over—are unobtainable under 68,000 to 68,500 rubles per pood (\$970 to \$977 per pound). Future prices are largely dependent on the quantities allowed by the government to be exported, for the internal consumption in Russia is not sufficient to influence prices.

The production of asbestos in the Urals in 1915 amounted to 8,689 short tons, or about half of the output in 1914. The sulphuric pyrites mined in the Urals in 1915 amounted to 39,400 tons, the district of Ekaterinburg being responsible for the whole production.

NEW LIBRARY WILL CONTAIN EVERYTHING ON GEOLOGICAL AND MINING SUBJECTS

With Completion of New Building of Department of Interior Space Will be Available for Needed Expansion in Library of Geological Survey—Miss Julia L. V. McCord, Librarian, Important Factor in Assembling Collection

By far the most complete collection of works on geologic and mining subjects in the world will be that of the United States Geological Survey when the new building of the Department of the Interior is ready for occupancy. The present library of the Geological Survey contains over 100,000 volumes besides the map and pamphlet collections. As it is, this library is the largest of its kind in the world. In the new building, however, the library of the Geological Survey will be combined with that of the Bureau of Mines and extensive additions will be made so as to bring the total number of volumes much higher.

For the past several years the increases in the library of the Geological Survey have been limited to the most essential works owing to the lack of shelf and file room.

In the new building the library will occupy a specially constructed room designed for the particular purpose for which it is intended. It will be equipped with the latest library furnishings. None of the book cases will exceed seven shelves in height, making all volumes readily available without the use of ladders.

The additional floor space, which will be available in the new building, will allow the admittance of a number of works which are not purely geological, but which are of important interest to the mining industry.

Other important geological libraries are maintained in New York by the Engineering Society and in London by the Geological Society of London. The latter is the oldest geological library, but its sets of geological works are not nearly as complete or extensive as those owned by the United States Government.

HAS BEEN POTENT FACTOR IN BUILDING UP LIBRARY

Miss Julia L. V. McCord, the librarian of the Geological Survey, is a Kentuckian. Her education was obtained in the public schools of Louisville and she was graduated from the high school there. Her higher education was obtained at George Washington University, in this city.

From early life Miss McCord took a great interest in science. After finishing her course at George Washington University she entered

the service of the Survey. For a time she did secretarial work in the office of Maj. J. W. Powell, who at that time was Director of the Survey.

In 1887 Miss McCord was assigned to work in the library and since that time she has



Photo by Harris & Ewing

MISS JULIA L. V. McCORD
Librarian U. S. Geological Survey

been continuously engaged in this work. In April, 1908, she was made librarian, after having taken a competitive examination.

Miss McCord has made a specialty of completing serials of valuable publications devoted to geology and mining. Through her persistent efforts many valuable works, which are not available in any other library, have been secured by the Geological Survey, and in other ways she is constantly adding to the unique value of this specialized library.

Miss McCord is a member of the College

Women's Club, and of the Columbian Women. In the latter organization she has held various offices for many years. She is widely known, due to her correspondence with publishers and scientists, in her efforts to gather all valuable works. She also has addressed the American Library Association and other organizations, which has brought her into prominent public notice.

HILL DESCRIBES MOUNTAINS OF EASTERN NEVADA

Striking features of the eastern part of Nevada are the arrangement of the mountain ridges along northward-trending axes and the wide, flat, barren valleys which lie between the ranges, as described by J. H. Hill of the Geological Survey.

The long, narrow northward-trending ranges are not everywhere of even height but are broken by narrow passes or low ridges into a number of parts, which have received different names. Thus one uplift is known as the Ruby Range in Elko County, as White Pine Range in White Pine County, and as the Grant and Quinn Canyon ranges in eastern Nye County. East of the White Pine uplift is the Egan Range, whose northern continuation in Elko County is the Spruce Mountain group and the Peoquop Range. East of the Egan Range the Schell Creek uplift of White Pine County is continued by the Ely and Highland ranges in Lincoln County. A spur which trends south-eastward, known as the Fortification Range and Cedar Mountains, branches from the Schell Creek Range a few miles north of the Lincoln-White Pine County line. One of the most prominent and persistent uplifts in the region here discussed is that which extends along the east boundary of Nevada and is called the Toano Range in Elko County and the Kern Mountains and Snake Range in White Pine County.

The southern end of the Snake Range, culminating at Wheeler Peak, in southeast White Pine County, is the highest part of the ranges in this region, but the Schell Creek and Egan ranges, immediately west of Wheeler Peak, are also high and very rugged. The Ruby Range, in south-central Elko County, is very prominent, its peaks standing well above any of the neighboring mountains. Practically all the ranges have steep eastern flanks, but the slopes to the west as a rule are more gentle. There are some places in all the ranges where the reverse conditions are seen, but in the main the above generalization holds true.

Lying between the mountains there are broad, flat-bottomed desert valleys which, like the ranges, have a northward trend. Eastern Nevada is somewhat better watered than the western and southern parts of the State, and near the mountains, particularly along

the east base of the higher ranges, there are many cattle and hay ranches, which obtain their water supply from streams that have their source in the higher hills.

Huntington, White Pine, and Railroad valleys, which lie on the west side of the White Pine uplift, are separated by low, flat divides, and it is hard to realize that they are really not all the same basin. In this line of depressions the ranches are on both margins of the valley, but as the Ruby and White Pine mountains are generally higher than the ranges west of the depression, most of the permanent streams rise in them, and it is only at a few localities that settlements or ranches are found on the west side of the valleys. There are no ranches on the east side of Ruby Valley, for most of the water in this vicinity rises in the Ruby Range. In Sierra and Butte valleys, which are separated by a low divide, most of the ranches are on the east side, along the flanks of Egan Range. Steptoe Valley is not particularly well watered, though there are a few ranches near Currie, Cherry Creek, Steptoe, and Ely. Antelope Valley is barren. Spring Valley, which lies between Schell Creek and Snake ranges, is well watered, and there are many prosperous ranches along the base of both ranges, though the Schell Creek side seems to be better watered than the Snake Range side except at the south end, near Wheeler Peak.

REPORT SHOWS HIGH GRADE COAL IN VIRGINIA FIELD

A report of the coal resources of the southwestern Virginia district has been issued by the Virginia Geological Survey. This report was prepared by Henry Hines, a geologist of the United States Geological Survey. The work was done cooperatively by the State and Federal Surveys. The report pointed out that the coals of a portion of the coal fields of southwestern Virginia are of coking quality and in general superior to the coals west of the Ohio river or in the greater part of the Appalachian coal field itself. An analysis by the Bureau of Mines of the samples taken by the Geological Survey makes a remarkable showing as to the low content of sulphur, moisture and ash. In some of the beds the coal is comparable with that of the Connells-ville basin of Pennsylvania.

ROOF FALLS IN MINES SUBJECT OF SPECIAL STUDY

D. F. McDonald, of the Geological Survey, is making a study of roof falls in mines for the Bureau of Mines. He will make an extended trip, during which practically all of the mining states will be visited. His investigation will be devoted more particularly to coal mines, but he will also make investigations at metal mines.

SAYS UNION HAS NOT MADE WORKMEN MORE EFFICIENT

By S. A. DRIVER, *Kitts, Kentucky*

Exception is taken by Mr. Frank J. Hayes, vice-president U. M. W. A., in the MINING CONGRESS JOURNAL of June, to my criticism of the attitude of unionism to the individual responsibility and efficiency of the mine worker.

Mr. Hayes says that statistics show that the loss of life is about three times greater in the non-union than it is in the union mines. This ought to be proof positive that the U. M. W. of A. is one of the greatest agencies in the country today for the promotion of safety in mines.

Fatal accidents in mines may be divided into two classes, common and exceptional, as is shown by Mr. Fay in Bulletin 115 of the Bureau of Mines. Common accidents are those which occur daily, and involve from one to not over four men. Exceptional accidents involve five or more at one time. Explosions, fires, and floods have caused by far the greater part of all deaths due to exceptional accidents, and unionism and non-unionism may be eliminated as a cause of great disasters; but in considering the common accidents which daily occur from falls of roof and coal, reckless use of explosives, ignorance of the requirements of the occupation or carelessness, the personal factor does enter the equation, and statistics show, that the U. M. W. of A. has not made the individual either a more efficient or careful workman. Mr. Fay justly takes the position that it is unfair to a state which works 250 days of nine or ten working hours to compare its accident rate with a state which worked 200 days of eight working hours, and he has therefore reduced his statistics to a 2,000-hour basis.

The following figures give the deaths due to common accidents for each 1,000 men employed on this basis for the 10-year period, 1903 to 1913, inclusive, with the exception of the year 1909:

<i>Union States.</i>		<i>Non-Union States.</i>	
Illinois	3.04	Alabama	3.80
Indiana	2.88	Kentucky	1.91
Ohio	3.84	West Virginia...	3.83
Wyoming	3.95	New Mexico ...	3.93
Oklahoma	4.46	Colorado	5.29
Kansas	3.83	Pennsylvania ...	2.82

These figures which are taken from Bulletin 115 of the Bureau of Mines must be accepted as standard authority on this subject, and clearly show that the statistician who furnished the figures on which Mr. Hayes based his statement, that the death rate in non-union mines is three times as great as in union mines, made a most serious error in his work.

In the above comparison by states, Pennsylvania and West Virginia are placed in the non-union states for the period under consideration, though there are several union dis-

tricts in these states, and the union, it must be admitted, seems to be rapidly gaining favor in the eyes of the operators in both of these states. The reports of the state inspectors show that the lowest fatality rate is found in non-union mines. During the year 1914 the H. C. Frick Coke Company employed inside the mines 7894 men and produced 11,723,873 tons of coal with twelve fatal accidents, or a death rate of 1.52 per thousand men and a production of 976,989 tons per life lost.

It should be noted that this 1.52 is the inside death rate per thousand employees, the total number of men employed both in and around the mines for 1914 was 12,942, the total deaths were 16 or 1.23 per thousand. If the record of this company is considered in its entirety with respect to the number of employees and production, it will stand above any in the United States.

The Pittsburgh Coal Company, whose mines are organized, had 14,826 inside employees in 1914, produced 10,408,149 tons of coal with a loss of 35 lives, or an inside rate of 2.36 per thousand. The total number of employees inside and outside was 16,620. It had no fatal accidents outside, which makes its death rate 2.11, or just the average of the State.

There are small operations which show even better rates than the above corporations, and we fully realize that comparisons are odorous and express the hope that if any officer of the Pittsburgh Coal Company should read this, he will be kind enough to think that the comparison is made only to refute the charge that union miners are three times as careful and efficient as non-union.

In West Virginia we find the record for safe operations held by a non-union corporation, the U. S. Coal & Coke Company, which in 1915 produced 1,618,491 tons with 1,663 employees and only one fatality.

For the year 1915 we may compare the non-union state of Alabama with the union state of Illinois. Alabama for this year reports no exceptional accidents and returns 63 fatalities in and around the mines among 23,058 employees, which worked 223 days of nine hours, which gives it a death rate of 2.73 per thousand and on a two thousand hour basis.

Illinois reports for the year ending June 30, 1915, 75,606 employees, 180 fatalities, mines in operation 172 days. If we deduct the 52 men killed in the Royalton explosion, and reduce the remaining 128 accidents to a 2,000-hour basis, we get a rate of 2.46 per thousand, which is very little less than the 2.73 rate of Alabama.

The reckless handling and use of explosives is the cause of many fatalities in mines, and the individual element is certainly a factor in these cases. Statistics compiled by Mr. Fay show that for the period ending December 31, 1915, for which continuous records are available, there were killed by explosives for

each ten thousand employees in Oklahoma, 8.60; Illinois, 3.40; Indiana, 4.20; Kansas, 6.81, Alabama, 2.70, and Colorado, 2.25. The first four are union, the last two non-union.

The miners, both organized and unorganized, but especially the organized, have fought the use of permissible explosives, notwithstanding the fact that the death rate from explosives has been reduced from 3.7 per ten thousand employees in 1903 to a little less than one per ten thousand in 1915, which reduction has kept pace with the increased use of permissible. Furthermore the increased safety due to the handling of permissible is only a small part of the increased safety due to its use. Good union miners, whose word I trust, and whose friendship I value, have told me of mines at which they worked in Indiana and Oklahoma being closed by strikes on account of a shot firer refusing to fire a shot which he considered unsafe. A strike followed the posting of Safety First notices in a Western mine.

The introduction of machines in mining is and always has been opposed by the union, though their use increases his earnings and safety, as is shown by the Illinois report for 1914 and Bulletin 115.

The miners of Wales are among the most closely organized in the world; the Welsh miner is as an individual workman the peer of any miner in the world, yet the production per man is among the smallest in the world, his union prevents his realizing the proper return on his ability and skill.

The mine workers' organization has among its various local and general officials many men of unusual mental capacity, among whom are born leaders of men, and when they devote their talents and energies to making the miner a safer and more efficient workman, a better man and citizen, the miners' union will become one of the most powerful agencies for good in the industrial world. But at present I see no reason to change my belief that its principal tenet is "Do less and ask more for it."

MINING REVIVING IN CHERRY CREEK DISTRICT OF NEVADA

The first discovery of ore in the Cherry Creek region of Nevada was made in 1861 on the Gilligan vein, in Egan Canyon, by John O'Dougherty, one of a party of immigrants who were following the Overland Stage Route to California. He built the first mill in Nevada in 1864 to treat the ores of the mine. Stretch reports that the total production of the mine up to 1866 was \$60,000.

The records of the Gold Canyon mining district begin in 1863, but the first entries are of bills of sale of previously located claims. In 1874 and 1875 Gen. Rosecrans was operating the Gilligan vein for the San José Mining Co. The Cherry Creek district was cut off from the Gold Canyon district in 1872, J. M. Hill of the Geological Survey records.

The first claim recorded in the Cherry Creek district was the Teacup, located September 21, 1872, by John Corning and Peter Carpenter.

It is said that the mines of this district were most actively worked between 1872 and 1883, during which time the population of Cherry Creek was about 6,000. There was also a fair-sized town at the head of Egan Canyon up to 1877. In 1884 mining began to wane, and in 1893, with the demonetization of silver, it practically ceased. Since 1895 some work has been done at various properties by different companies, particularly at the Star, Exchequer, and Biscuit mines.

The production of the early days is not known, though estimates range from \$6,000,000 to as high as \$20,000,000.

There are two somewhat overlapping types of veins in the Cherry Creek (Egan Canyon) district. One type, represented by the Wide West, Cocomongo, and possibly the McMurtry prospect, has its principal value in gold, carried in a white quartz gangue that shows a minor amount of pyrite and less galena. The other and by far the most important in the district is represented by the Exchequer, Star, Biscuit, Cherry Creek, and Gilligan veins, which carry galena, sphalerite, pyrite, and rich secondary silver minerals. That there may be a transition between these two types is strongly suggested by the Exchequer-New Century vein, in Exchequer Canyon, north of Cherry Creek. West of the canyon, on the Exchequer ground, the quartz carries the base-metal sulphides and contains more silver than gold; and east of the canyon, on the New Century ground, what appears to be the same vein is not strongly mineralized, but carries pyrite, gold, and silver. It may be that the gold and silver bearing portions of the veins are those parts which have not been strongly mineralized, and that the ore shoots will all prove to be of the lead-zinc type, carrying more silver than gold. In both types the veins are strong in the quartzites but tend to finger out where the fissure enter argillaceous shales. This is particularly well shown on the Gilligan and Star veins.

At the upper tunnel on the Cherry Creek Co.'s property the ore body is a mineralized quartz monzonite dike carrying galena, sphalerite, and pyrite. It is evident that the dike was metallized after its consolidation, and it is believed that most of the veins of the district were formed shortly after the intrusion of the quartz monzonite.

The lead-zinc veins have been crushed since the deposition of the original ores and have been enriched by descending waters which have deposited rich silver minerals such as argentite, proustite, and an antimonial silver-lead-copper mineral of uncertain composition. The enrichment of the Star vein, as indicated by the largest stopes, was greatest between the third and seventh levels but

extended to a depth of 600 feet vertically below the croppings. At the Biscuit mine argentite and copper carbonates are said to have been found to a depth of 1,100 feet on the dip of the vein.

WOODBIDGE REPLIES TO ORE-SAMPLING CRITICISMS

Replying to a communication published in the September issue of THE MINING CONGRESS JOURNAL, T. R. Woodbridge says:

"In the September issue of the JOURNAL I note extracts from a communication from Mr. Meyer concerning ore sampling. The statement credited to me in the August issue is merely a portion of the foreword of a report I have made for the Bureau of Mines on Ore Sampling Conditions in the West, to be published as Technical Paper No. 86, and was therefore but the briefest outline of some general conclusions.

"If Mr. Meyer should care to read the full report he might find that we do not differ so very much in the essentials of sampling practice, and I therefore prefer not to discuss his remarks very fully at this time. There are, however, a few statements I wish to refer to now.

"Referring to No. 3, I do not recommend one single method of sampling, but do urge the standardization of such methods, whether hand or machine, as individuals may use.

"In No. 5 the expression, 'larger or smaller discrepancy,' is rather indefinite, but if it means that with high-grade ores the sampling and assay differences are always disturbingly large, it is contrary to my experience.

"In No. 6 the desirability of the amount retained depends entirely on how closely it represents the original shipment. One per cent in one plant might be safer than 25 per cent in another plant. Custom sampling plants usually retain the whole lot, but this practice does not seem feasible in mills or smelters.

"In No. 7 we find the nub of the whole matter in the phrase, 'if also proper care is taken that the proportion of fine and coarse material is maintained in the sample.' How is one to determine this 'proper proportion'? And how 'maintain' it after it has been discovered? If we substitute the words, 'gold and silver' for 'fine and coarse material' we have a transformed phrase reading, 'if also proper care is taken that the proper proportion of gold and silver is maintained in the sample.' And this, verily, is our original problem.

"As to No. 8 we have to confess that our moisturing methods are compromises and, as usual with compromises, are causes of much dissatisfaction between buyer and seller. I cannot see the same necessity in the weighing.

"No. 9, does not come within the scope

of my report, though I don't mind saying personally that I have not yet become convinced that making a man a government employe acts like the baptismal service in expelling the Old Adam from his system.

"I am very glad to see these statements from Mr. Meyer, even though my full report was not available, for the more fully this report is discussed and criticised the better pleased I shall be. During my experience in sampling, covering several absorbing and even fascinating years of study of sampling systems and experimenting with various ores in many mining camps, I have naturally come to certain definite conclusions; and my former associates and customers will doubtless recognize some former arguments. Nevertheless I have tried to be in a receptive mood during this investigation, and to show conditions as they are, and at the same time to make suggestions for their possible improvement.

LITTLE DEVELOPMENT BEING DONE AT DOLLY VARDEN

Following a visit to the mining districts of eastern Nevada J. M. Hill, of the Geological Survey has the following to say concerning the Dolly Varden district:

So far as could be learned, the first discoveries of mineral in the Melrose (Dolly Varden) Mountain were made in 1869, at the silver-lead mines in the southeastern hills, near what was called Hicks Spring, later Last Chance Spring, and now locally Dolly Varden Spring. In 1872 the copper ore at the Victoria was opened and for about two years was actively worked, the ores being smelted in a Mexican furnace at Dolly Varden Spring. Since the closing of the Victoria mine development in the district has been slight. Some excitement was caused by the discovery of the gold-bearing veins in the Mizpah section in 1905, but it was apparently short lived. Small shipments of ore have been made from time to time from the Victoria dump, and a little lead-silver ore has been extracted from the mines east of Castle Peak. In September, 1913, there were about ten prospectors in the mountains. One company had been operating a churn drill for a couple of years, but at the time of visit it was understood that the work was to be discontinued.

The production from the Victoria, Keystone, Eugene, and Hidden Treasure mines in the early days can not be learned, but it appears not to have been large.

The deposits of the Dolly Varden district are clearly related to the quartz monzonite intrusive. They occur as contact-metamorphic and replacement deposits in the area of Carboniferous limestones and shales at the south end of the mountains and as veins in the intrusive rock in the vicinity of Mizpah.

The deposits in the sedimentary area are of two well-defined types. Oxidized copper

ores, presumably derived from original deposits of pyrite and chalcopyrite, are usually associated with the lime silicate minerals and are nearer the intrusive contact than the lead deposits. The latter, found only in the extreme southeast part of the district, are typical replacements, both as fissure and bedded, occurring near fissures in limestone.

The ore minerals of the copper deposits so far developed are all of the oxidized variety, though kernels of the original chalcopyrite and pyrite remain at many places, and at not a few localities, where development has penetrated below water level, slightly cupriferous pyrite is seen to be the chief original sulphide. Chrysocolla, copper pitch ore, and malachite are most abundant, though chalcocite can usually be seen in the richer specimens of ore and bornite is exceptionally present. Limonite, as is to be expected, is present in abundance in all the copper deposits. The gangue minerals are quartz, green garnet, light-green biotite, and tremolite (with calcite and actinolite at some localities). The metamorphism due to the intrusion of the quartz monzonite magma has not been as intense as in some districts, and the croppings of the lime silicate zones and ore bodies are few and small.

It seems rather doubtful if any large bodies of enriched chalcocite ore will be found in this area, as the water table is near the surface—90 feet at Moore's shaft and 60 feet at the Anchor mine. At Moore's shaft the zone of chalcocite ore has apparently been traversed and is reported to be very narrow. At the Anchor mine the shaft is now at the water level, but the chalcocite zone has not yet been reached.

The original ore apparently contains only a small proportion of copper-bearing minerals. The same remarks are pertinent to the deposits of the Iron Duke and Franklin group and to those of prospects a short distance west of Watson Spring.

The argentiferous lead-bearing replacement deposits in the vicinity of Castle Peak are closely associated with north-south fractures cutting the limestones, along which the ore-bearing solutions have evidently moved. The principal minerals of these deposits, all of which are silver bearing, are cerussite, anglesite, and residual kernels of galena. Here and there a little copper carbonate stain is seen.

Small quartz veins characterized by chalcopyrite and minor pyrite and bismuthinite are typical of the veins in the intrusive rock. They are gold bearing, and some free gold is said to occur in the veins near Mizpah Spring. The solutions which deposited the veins have also altered the adjacent quartz monzonite, though usually in very narrow zones. Few such bands of sericitized and calcitized rock are over a foot in width, and most of them measure only a few inches.

At one place one-half mile east of Mizpah Spring an irregularly shaped body of thor-

oughly altered quartz monzonite about 300 by 200 feet in maximum dimensions somewhat resembles the croppings of the upper leached portion of the "porphyry copper" deposits.

HEALTH PRECAUTIONS PAY EMPLOYERS AND EMPLOYEES

Washington Post.

Many of the greatest reforms have been brought about by interest that could not be described as wholly altruistic. It is no reflection upon human nature to say that self-interest, the desire to stand forth as a leader or win a place in history, has prompted many of the greatest achievements in behalf of humanity. It was self-interest that led many of the largest corporations in the country to establish pension retirement systems for their employes, yet no one can say that the motive detracts from the substantial human reform that has been accomplished.

It must be admitted therefore that the Bureau of Mines is approaching the problem of health conservation from the right angle when it accentuates the financial saving which accompanies such conservation. From a human standpoint, there is no question of the importance of the prevention of the conditions productive of ill health among workers. When the employers realize, however, that there is a vast financial saving involved they will establish the reform as a business economy as well as a benefit for individuals.

The bureau of mines points out that the average loss of time due to illness among approximately 30,000,000 workers is nine days a year. If medical attention be estimated at \$1 a day and earnings at \$2 a day, this loss amounts to nearly \$880,000,000 annually.

This, however, is the loss that is borne by the workers. Nevertheless, since every man that works must earn a profit for the employer, it can readily be appreciated that the loss to the employer is almost as great as the loss to the employes. If all mills and factories were to close down for nine days, the loss in commerce would be much greater than \$880,000,000. It would be estimated in the billions.

As the dropping out of the employes is not simultaneous, however, the loss is not so great, but surely it is large enough to warrant a considerable investment in health precautions. Industrial efficiency depends on the workers, and health is the workman's capital and stock in trade. Captains of industry everywhere should take note of the recommendation of the Bureau of Mines in favor of a system of medical supervision to prevent introduction and spread of contagious diseases and an examination of all candidates for employment and of men already employed, so that those physically or mentally defective may be identified and given medical attention.

GOVERNMENT EXPERTS WELL KNOWN TO MINING MEN



Photo by Harris & Ewing.

E. S. LARSEN, Jr.
Geologist

E. S. Larsen, Jr., was born in Astoria, Ore., March 14, 1879. He was educated in the public schools of Portland and is a graduate of the high school there. His higher education was obtained at the University of California, from which institution he was graduated in 1906 with a degree of B. S. Afterwards he took one year of post-graduate work at the University of California. One summer during his attendance at the university Mr. Larsen worked with a field party of the Geological Survey in southern California.

Following the completion of his school work Mr. Larsen came to Washington, where he became connected with the Geophysical Laboratory of the Carnegie Institution. He spent two years in this work as assistant petrographer.

In 1909 Mr. Larsen came with the Geological Survey as an assistant geologist. He attained the rank of geologist in July, 1914. He is at present in charge of the sub-section of petrology, which makes necessary considerable office work in Washington. He is able, however, to find time for some field

work and has done extensive petrographic work in Colorado. He also has conducted some investigations of the same nature in California and Montana.

RICHEST ORE CONTAINS ONLY THREE GRAINS OF RADIUM TO TON

Radium-bearing minerals are found in commercial quantities in the United States in Colorado and Utah. In Colorado a small area near Central City, Gilpin County, carries pitchblende, which is a uranium oxide carrying minor quantities of other elements. Carnotite is, however, the principal radium-bearing mineral and is found in southwestern Colorado and southeastern Utah.

Pitchblende is, as its name will indicate, a black, pitchy mineral. It has a very high specific gravity, almost as high as iron. Carnotite is a bright canary yellow and generally a powdery mineral. Practically all of it occurs in the area mentioned in a soft sandstone.

So far as is known, radium is in the elemental condition in these minerals. It must be understood, however, that radium occurs in such minute quantity that it is never visible as found in the ore. The richest ores known contain less than three grains of radium per ton, and owing to the rapidity with which it changes into other elements it is not probable that radium will be found in greater quantities.

TAMPICO DISTRICT REGARDED AS GREATEST OIL FIELD

Without question the Tampico district of Mexico is the most wonderful oil field in the world in the proportion of successful to unsuccessful wells, in the opinion of E. W. Shaw, of the Geological Survey, who has just returned from a business visit to Mexico. He reports that the most intense competition exists between companies in the matter of making locations, despite the very unsettled political conditions in Mexico.

Owing to the disturbed condition of the country the production in the Tampico region is being held as low as possible. If the conditions were favorable the production of this field would be increased very materially, Mr. Shaw reports.

SURVEY OIL SPECIALISTS GO TO SOUTH AMERICA

G. C. Matson, of the Geological Survey, has been granted a short leave of absence, during which he will visit Colombia and some of the Central American republics for a large oil company. He will do general scouting work. G. S. Rogers, of the Survey, will assist Mr. Matson.

Latest Traffic Developments

Iron Ore Cases Decided

In the iron ore rate cases the Commission found that:

1. With certain exceptions, upon the whole record, (a) that the present groups, both of the lake ports and of the points of destination, are, and for the future will be, unreasonable and unjustly discriminatory within the meaning of sections 1 and 3 of the act to the extent that they differ from those herein found to be reasonable; (b) that the rate relationships of the several destination groups are, and for the future will be, unreasonable and unjustly discriminatory to the extent that they depart from those herein fixed; and (c) that the rates at present maintained and here under consideration are, and for the future will be, unreasonable and unjustly discriminatory to the extent that they exceed the rates herein shown as reasonable maximum rates.

2. Carriers required to establish separate charges for storing ore on their docks and for certain other dock services performed by them, also for switching and other services on private industry tracks. Reasonable maximum rates prescribed for the dock services, and a charge on the engine-hour basis suggested for the services on the private industry tracks.

Chicago Divisions Unchanged

In the matter of advances on coal within Chicago switching district the commission says:

In the original report in this proceeding we held that the respondents had not justified proposed increased rates on coal and coke from mines in various states to points on the line of the Chicago, Milwaukee & St. Paul Railway in Chicago. The carrier named performs only a terminal service in Chicago on this traffic. It now asks that we fix the division which it may receive out of the through rate. We hold that upon the whole situation the commission does not feel justified in ordering a basis of division different from that now existing.

Coal Rate Increase Denied

In the matter of coal to Red Wing, Minn., the commission holds:

1. The Chicago, Milwaukee & St. Paul Railway Company denied authority to maintain a rate on coal from Chicago and Milwaukee to Red Wing, Minn., lower than to intermediate points.

2. Chicago Great Western Railroad Company authorized to establish a proportional rate from Chicago and points taking the same rates, on bituminous coal in carloads, when

originating at points in Kentucky and West Virginia, to Red Wing, Minn., the same as the rate maintained by the Chicago, Milwaukee & St. Paul Railway Company from Milwaukee to Red Wing, and to maintain higher rates at intermediate points between, but not including, Alta Vista, Iowa, and Red Wing.

3. Orders of suspension vacated.

LACK OF SHIPS HOLDS

DOWN EXPORTS OF LEAD

The average difference between the prices of lead at New York and at London for the 10 years prior to 1914 was not far from 1½ cents per pound, the price at New York being the higher according to C. E. Siebenthal of the U. S. Geological Survey. This being the case, exports of domestic pig lead should be expected only under temporary or very unusual circumstances. The practice of the Bureau of Foreign and Domestic Commerce has been to class all exports of lead articles manufactured in this country as domestic exports, whether the lead be of domestic or foreign origin. For this reason no table of exports of domestic lead manufactures has been given, because such a table must have duplicated the table of foreign lead in manufactures exported with benefit of drawback. Since the exports of domestic pig lead began, however, they have been shown separately.

In 1914 the price of lead at London rose above the price at New York early in January and consistently remained between one-fourth and one-half cent per pound above throughout the year. This made it possible to export domestic lead at a profit, and the decrease in imports of lead ore and bullion from Mexico rendered it necessary to satisfy the foreign demand with domestic lead, the exports of which assumed large proportions. The movement commenced in March, 1914, and by the close of the year 58,722 short tons, valued at \$4,501,674, had been exported. Likewise in 1915 the price of lead at London was from one-fourth to 1 cent a pound higher than the price at New York, except for the period of high prices in the United States during June and July. Exports of domestic lead continued heavy throughout the year, reaching a total of 87,092 tons, valued at \$7,796,998. The exports were probably held down to a certain extent by the lack of shipping facilities.

WILLIAMS RETURNS FROM

VISIT TO OIL FIELDS

W. A. Williams, chief petroleum technologist of the Bureau of Mines, has returned from an extensive visit to the principal oil fields of the West. The trip mainly was to gather information before planning the Bureau's work for the coming year. On his trip Mr. Williams visited fields in California, Wyoming, Montana and Oklahoma.

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EDITORIALS

CONSERVATION PLAN TO BE CONSIDERED.

After years of restriction of the development of Western mineral resources by land withdrawal orders "in aid of legislation," Congress has again adjourned without definite action.

The public sentiment which a few years ago seemed to demand drastic and almost revolutionary changes in the control of our mineral lands, has gradually lost some of its ardor, and has begun to see that the policy of Lincoln after all did not contain so much that was vicious.

The Ferris land leasing bill, which passed the House by a very large majority, was so amended by the Senate Committee as to call forth Mr. Pinchot's severe criticism, although it recognized the leasing principle, but also provided for the relief of the California oil claimants, whose rights had been initiated under the provisions of the existing Land Office regulations.

In the meantime, the American Mining Congress has been urging a bill for the appointment of a Congressional commission, which by public hearings

throughout the West, should determine what changes in the law are necessary, and make recommendations to Congress.

The original plan was that this commission should investigate the whole mineral land problem, but the conservation program undertook to deal with the fuel minerals and water powers, leaving the proposed commission to deal with the metalliferous deposits only. This bill has been passed by the United States Senate, but has failed in the House of Representatives.

The great difficulty has been that the West has had no comprehensive policy, and even western Representatives in Congress could not get together upon an intelligent and comprehensive plan for handling this situation. The belief that those resources which are essential to industrial prosperity should not be permitted to pass beyond public regulation must be considered, but it must also be recognized that the individual States must have the benefit of their own natural resources.

In view of the present legislative situation the Mining Congress feels that the time is opportune for a campaign to re-open mineral resources to development, to protect the interests of the States, to meet the eastern criticism against fuel and power monopoly and to work out a perfect conservatism, viz: the highest use and the least possible economical waste of the great mineral resources of the West.

How can the most intelligent effort be made in this behalf? This plan may meet the situation:

That each of the Governors of the Rocky Mountain States shall send a special delegation of representative men to meet at Chicago, in conjunction with the American Mining Congress convention in November, instructed to give thorough consideration to this subject and to formulate the most comprehensive policy which can meet general approval.

That the discussions of western subjects by the convention shall be such as to lend color to the more conservative work of the special commission, and thus secure for its work the attention of the press and public.

That the convention as a whole (which will include strong delegations from States having several times as many representatives in the House as the Western States) shall be asked to approve resolutions embodying the recommendations of the Special Commission.

MINE SAFETY

In an article by Mr. S. A. Driver published in the July issue of the MINING CONGRESS JOURNAL, it was contended that the burden of mine safety work during the last few years in the United States had devolved upon the mine operators, and that the miner himself had not met his full share of the responsibility. Mr. Driver pointed out that 52 per cent of the accidents in the coal mines resulted from the fall of roofs and asserted that these accidents largely could have been prevented by reasonable care on the part of the miner, whose duty it is to place props in position to prevent such accidents, the operator being required, under severe penalty, to provide the necessary props.

This charge was not made as against union miners, but against all miners, the statistics being more or less general from which the data was taken.

Mr. Frank J. Hayes, in a later issue did not reply to the main issue, but pointed out that the record for mine safety is much better in those districts where union labor is employed than elsewhere. In another column Mr. Driver disputes this statement and gives statistics to prove his contention. The real question which should be considered is what further steps can now be taken to further lessen the loss of life in mining operations.

The fixing of responsibility upon either operator or miner is only of value when in finding out we may provide a remedy.

The great purpose of the Mining Congress' work is to reduce the number of accidents in mining operations. It is important to know the cause of accidents, and where the negligence of either operator or miner tends to increase accidents, every effort should be made to prevent the negligent acts, through which accidents are brought about. The operator is penalized when he fails to give proper props to prevent the falling of roofs. If he fails to meet this requirement he should be punished for his negligence. Upon the other hand, having met his responsibility, if the miner

is negligent, there should be some method of requiring him to exercise the highest degree of diligence in this respect.

The miner, perhaps, may have the right to risk his own life from a purely personal standpoint, but he has not the right to gamble with the support of his family, nor gamble with the obligation of his employer to recompense his family in case he is injured or killed.

If Mr. Driver's contention is well-founded it would seem advisable that the negligence of the miner himself should be punished by severe penalties.

The great safety campaign, by the Federal Government, by State organizations, and by mining companies has accomplished big results but much yet remains to be done.

Fifty-two per cent of the total accidents in coal mines resulting from one cause as against 48 per cent from all other causes, including explosions, would seem to indicate that this is the most fruitful field in which to work out better conditions. What is the remedy? Our columns are open for a discussion of this subject.

THE PUBLIC LANDS QUESTION

Whether the Ferris Land Leasing Bills shall be enacted or whether the amendments made by the Senate committees shall prevail is of vital importance to the West.

Whether the oil claimants of California whose rights are based on a compliance with the U. S. land office regulations then in force shall be robbed of their property without right of appeal to the courts as the Alaskan coal claimants have been is of vital importance to every loyal citizen.

Whether the resources of the West are to pay endless tribute to the national Government through a Federal leasing system or whether these resources shall be subject to the taxing power of the States concerns directly every tax payer. Whether a cumbersome agency two thousand miles away without knowledge of conditions shall control Western development or whether the basic principle of republican government, home rule, shall

prevail and our development be controlled by those who know, is the most important and pressing question now facing the West.

The coming session of Congress will probably finally pass upon these questions. The leasing bills have passed the House of Representatives and are now before the Senate. Western Senators are entitled to great credit for the work thus far accomplished. The Senate is likely to approve the work of its committees but unless the West shall rally to the support of the Senate committee recommendations, there is grave danger that the House of Representatives will refuse its approval.

The Chicago convention will give full consideration to this important question.

LACK OF FUNDS HAMPERS PROSPECTING FOR POTASH

Congress always is rather remiss when it comes to consider appropriations which will benefit the mining industry. This is the more apparent when mining appropriations are compared with appropriations looking to the advancement of agriculture.

Two very necessary expenditures have been pointed out to the appropriations committee on several occasions by the Director of the Geological Survey, but the committee has not seen fit to act upon his suggestion.

Since the beginning of the war in Europe great losses have been suffered in the United States and in other parts of the world due to the isolation of the great potash producing area at Stassfurt. As is set forth in the news columns of this issue, certain portions of our own territory are very likely to contain potash deposits similar to those found in Germany. Regardless of the urgency of discovering potash deposits, Congress has refused to allow more than a paltry \$20,000 for this prospecting work. Twenty thousand dollars is only enough to make one drill hole to the depth necessary to make an adequate exploration. Of course this sum must pay for various expenses other than drilling. For instance it is necessary to have a high-salaried

scientific man at the well at all times in order to make an immediate examination of all matter being passed through by the drill.

The other matter in which Congress is being penny wise and pound foolish is that of not allowing expenses for sending Government representatives to the meetings of scientific societies. In this connection Dr. Smith made the following statement before the appropriations committee of the last session.

Such attendance is, in my opinion, important if not essential in connection with the regular official work of the Survey. As it now stands, a member of the Survey who in the line of official work attends such a meeting does it at his own expense. In some cases we consider it so important that we incur that expense and pay it ourselves. It is not in any sense in the nature of a junket.

At the meeting of such professional societies are gathered the very men that we want to meet in connection with some specific part of the official work, and it is cheaper to visit six men at one place rather than the same six men at four, five, or six places; and that is the time they gather together. Such a meeting is that of the American Institute of Mining Engineers, every meeting of which that I can attend, I do attend. At the present time it involves some personal expense to myself; but, worse than that, it prevents the attendance of some other members of the Survey that I would like to have attend such meetings.

They are for the discussion of technical papers, but the most important thing is that the men that we wish to see, the mining engineers from all parts of the country, gather there. For instance, in the collection of our mineral statistics the mining men are the men upon whom we have to depend to furnish those statistics, and I should like to see a half dozen of the men who are engaged in our work attend such a meeting as I attended a few weeks ago at New York, so as to talk over the work which is now done by correspondence.

As a regular incident of the Survey work one of our statisticians or geologists will go from here to Pittsburgh or from here to some other industrial center to see one of these men and it may be to another point to see another man. Other meetings of similar character are the meetings of the West Virginia Coal Operators, American Fertilizer Association, Lime Burners' Association, American Mining Congress, and last summer, I attended some of the engineering congresses at San Francisco. I feel that I was there not simply as a delegate appointed by the Secretary of the Interior and the President, but that I was there in connection with the offi-

cial work of the Geological Survey, but under the existing statute, which prohibits that kind of a thing, except for a few of the bureaus. I was compelled, as were other members of the survey who were in that vicinity and who attended those meetings, to pay the expenses, as we were not allowed to include the expenses incurred in attending such meetings in our official accounts.

It is to be hoped that Congress at the next session will recognize that the attendance upon technical society meetings is a legitimate and indeed an essential part of the public service to be rendered by scientific bureaus which are devoting their principal effort to the benefit of the mining industry. It is very easy to safeguard such a privilege from abuse if Congress should feel that such a safeguard is necessary.

COMPULSORY ARBITRATION

One of the most important questions requiring attention by the American people is the compulsory arbitration of disputes in which the public has a direct interest often greater than the interest of the parties to the dispute.

Nearly all disputes between individuals or communities are already subject to compulsory arbitration. The individual who attempts by stealth or violence to right his own wrongs becomes at once a criminal subject to arrest and punishment.

This condition prevails as to individuals whose dispute may be no possible concern to any one else. Obedience to law is the first duty of every citizen and the price he pays for the protection of the law. Failure to receive this protection justifies his refusal to respect the law. A public service corporation is bound to furnish its service to all who meet its reasonable requirements. It is the right of every citizen to demand that all of the usual channels through which the necessities of his existence are supplied shall not be intentionally interfered with.

Any baker in the city of Chicago has a perfect right to suspend operation, but if all the bakers of Chicago by concerted action (*i. e.*, conspiracy) shall close up their shops at the same time the

courts would quickly interfere to punish the conspiracy.

The baking of bread is not a public utility. Bake shops are not even a public necessity. Individual baking facilities are easily acquired and each person can bake his own bread. Bake-shop service may not be a commodity. Notwithstanding this, if the bake-shop proprietors by concerted action shall shut off the usual supply of bread the law would quickly assert itself.

By what theory of justice or equity have the bakers a right, through a union or otherwise, to bring about a result which, if brought about by the proprietors, would subject them to severe penalties?

In those cases of dispute where the interest of the public is materially affected, the right of that public seems evident to insist upon some method of settlement which will not too greatly prejudice its rights.

MINING LAW REVISION

The next session of Congress will have under consideration the Foster bill for a revision of the mineral land laws of the West.

It will be remembered that a bill for a commission to investigate Western conditions by public hearings in the Western mining centers and to make recommendations to Congress was passed by the Senate but failed to receive the approval of the House Committee on Mines and Mining. In its stead Dr. Foster, the chairman of this committee introduced a bill intended to meet the requirements without the preliminary work of a commission. This bill has been severely criticized by the West and by mining trade journals.

A thorough discussion of this subject will take place at the Chicago convention.

Dr. Foster will lead the discussion in favor of the plan which he proposes to meet the continuous demand of mining men for a revision of the mining laws.

A plan of future action will be outlined by the convention and a campaign begun to bring about practical legislation or to continue the present conditions.

APPRECIATION OF BUREAU OF MINES SAFETY WORK SEEN IN RESIGNATIONS

**Edward Higgins and G. W. Riggs, two of Bureau's High Salaried Specialists,
Accept Service with Private Organizations—Former Goes with Group
of California Companies, Latter with Nevada
Operators' Association**

A striking indication of the increasing interest on the part of private mining enterprises in safety work comes with the announcement that Edward Higgins, of the Bureau of Mines, has been employed by a group of California companies as a safety engineer. Mr. Higgins has represented the Bureau of Mines in its cooperative agreement with the California Industrial Accident Commission and has done remarkable work. That he left the service of the Bureau is the cause of very sincere regret on the part of the director and other officials of the Bureau.

Since a small group of private companies has seen fit to offer Mr. Higgins twice the amount of remuneration he was receiving from the government they realize that Mr. Higgins could not afford to refuse to grasp such an opportunity. At the same time, the officials of the Bureau of Mines see in this action the strongest possible endorsement of the work they have been doing in the interest of safety in mining operations.

OPPOSED AT FIRST

When the safety work was first undertaken by the government it met with very general opposition. In some quarters this opposition amounted to active hostility. It was regarded as an unwarranted interference with the rights of private enterprise and even the more generously inclined thought that the work would be meddlesome and unproductive of good. Through the exercising of splendid tact and by proving in innumerable instances the practicability and advisability of the safety measures advocated by the Bureau, the opposition has disappeared almost entirely. Safety engineering has become a recognized profession. Men who have demonstrated their ability in this activity are in demand among mining companies and the number employed is increasing constantly.

Mr. Higgins has demonstrated an unusually high grade of ability as a safety engineer. He undertook a very difficult problem in California and succeeded with it beyond all expectations. The fact that he is to be connected with a group of important mining companies in California is expected to do much toward broadening the cause of safety work.

ANOTHER RESIGNATION

Another resignation was that of G. W. Riggs who has become safety engineer for the

Nevada Operators' Association. He will organize safety work and train men in rescue and first-aid work in the mines of the members.

The Nevada Operators' Association called upon Director Manning of the Bureau of Mines for a suggestion as to some safety engineer who could do this work properly. Mr. Manning suggested the name of Mr. Riggs as he is doing work in that district and is well known to most of the operators with whom he would have to deal. Mr. Manning expressed the keenest regret at losing Mr. Riggs' services, but he feels that just at this time, when the operators are beginning to employ safety engineers, that every effort should be made by the Bureau to see that efficient men are employed. In case a group of operators should by chance employ an unscrupulous or incompetent man the influence might be very hard to overcome, it is recognized.

CAR SUPPLY FIXES OUTPUT OF MINES IN MIDDLE WEST

The output of mines in Indiana and Illinois is being limited by a car shortage, according to Geo. H. Ashley of the Geological Survey, who has just returned from a visit to these states. Coal operators, he declares, resent the diversion of coal cars to other uses. Since some other classes of freight are more profitable the coal mines are being deprived of a considerable number of cars that could be put at their disposal, it is claimed.

While in Illinois Mr. Ashley, together with E. O. Ulrich, George H. Girty and Charles Butts of the Geological Survey; Frank DeWolf, the State Geologist and Prof. Stewart Weller of the University of Chicago, an effort was made to settle a geological question of long standing. The question is the determination as to whether certain rocks are Chester or Ste. Genieve. This problem has been the subject of considerable work on the part of the State Surveys of Kentucky, Tennessee, Missouri, Illinois and Indiana. It is quite important that it be settled as it has an important bearing on determining structures showing the possible occurrence of oil. The solution of the problem would have other economic values as well.

Latest Mining Patents

Process of Extracting Alkali-Metal Compounds. No. 1,197,556. This invention is by Henry B. Slater, of Riverside, California.

This invention relates to a process of extracting alkali metal compounds from minerals and mineral residues containing alkalis.

One object of the invention is to obtain alkali, particularly potash, from minerals and mineral residues containing alkali compounds. Another object is to obtain the alkali referred to, by treating the mineral or minerals residue with a solvent rich in chlorides of higher form so as to produce the alkali in the form of chloride. The invention is applicable to the recovery of potash from feldspar and other minerals containing potash and also to the recovery of potash from mineral residues such as the flue dust of cement and other works.

Method of Extracting Precious Metals from Their Ores. No. 1,198,011. This invention is by Thomas B. Crowe, of Victor, Colo., Assignor to the Portland Gold Mining Company of Colorado Springs, Colo., a Corporation of Wyoming.

This invention relates to the extraction of precious metals from their ores and particularly to extraction by the so-called cyanide method, although the invention is not limited to the use of any particular solvent. A method is devised which consists essentially of applying a pressure greater than atmospheric pressure to the mixture of solvent solution and ground ore during the agitation of same.

Apparatus for Roasting and Sintering Ores. No. 1,197,199. This invention is by James Gayley of New York, N. Y., Assignor to American Ore Reclamation Company of New York, N. Y., a Corporation of New York.

This invention relates to the improvement in the construction of sintering machines, more particularly those of the Dwight and Lloyd type, in which continuous traveling grates made up of articulated elements or pallets are moved over a suction or wind box to produce through a body of ore contained in the pallets a down draft which roasts or sinters the ore after it has been ignited at the surface.

Apparatus for Washing Coal and other Minerals. No. 1,197,932. This invention is by Paul Habets, of Montegnee, near Liege, and Antoine France of Liege, Belgium.

This invention relates to an apparatus for washing minerals for the purpose of separating out the denser material, for instance apparatus for washing coal so as to separate out the schist or heavier stony material from the coal proper. The invention refers more particularly to that type of coal washing apparatus wherein a stream

of water is guided by suitable means, such as a trough or launder so as to entrain with it the mineral to be washed, the entraining stream carrying the mineral to suitable means for separating the schist from the coal. The object of the invention is to enable the schist to be discharged from the separating means by devices which will prevent the waste of water or will reduce to a minimum the amount of water discharged with the schist.

Process of Treating Ores. No. 1,197,589. This invention is by Raymond F. Bacon, of Pittsburgh, Pa., Assignor by Mesne Assignments, to Metals Recovery Company, a Corporation of Maine.

This invention relates to the treatment of non-sulphide ores, and ores containing non-sulphide metal constituents, in order to make the same amenable to flotation methods of concentration, and to the subsequent concentration thereof by flotation. This invention involves the conversion of such non-sulphide ores into sulphides, and the production of colloidal sulphur therein by treatment of the ores, either simultaneously or successively with sulphur dioxide and hydrogen sulphide whereby the ores are subjected to the action of hydrogen sulphide in the presence of sulphur dioxide and the sulphidation of the ore and the formation of colloidal sulphur effected by a single operation.

Excavating Machine. No. 1,196,957. This invention is by Charles B. King, Charles S. Johnson and Benjamin Jacoby of Marion, Ohio, Assignors to the Marion Steam Shovel Company of Marion, Ohio.

This invention relates to excavating machines and more particularly to an excavating machine of the steam shovel type utilizing an internal combustion engine as its source of power. The object of the invention is to provide an excavating machine in which a single gas engine will be utilized to drive the various parts of the mechanism and the power will be so distributed and controlled as to enable these various parts to be operated and controlled in substantially the same manner in which they are operated and controlled by the individual steam engines.

Apparatus for Separating Coal, Ore, etc. No. 1,197,946. This invention is by Frank Pardee of Hazleton, Pa.

This invention relates to an apparatus for separating solid substances of different specific gravity and weight and is of the hydraulic or jig type constituting one means by which the separating operation set forth and claimed in application filed May 2, 1913, Serial No. 765,170, may be carried into effect in separating some of the commercial sizes of coal from bone or slate.

or in separating various kinds of ore from rock and other foreign substances or impurities.

Rock Drill. No. 1,196,011. This invention is by Niels C. Mickelson, of Denver, Colo., Assignor to the Denver Rock Drill Manufacturing Company of Denver, Colo.

This invention relates to a means for controlling the supply of cleansing fluid to a drill hole made by the drilling mechanism and the object is to provide novel, simple and practicable means by which the normal supply of cleansing fluid can be greatly augmented as is very desirable under certain conditions of work.

ELECTRICAL TRADE CONSUMES

GREAT BULK OF MICA

The chief physical properties that give value to mica are its cleavage, flexibility, elasticity, transparency, lack of color in thin sheets, non-conductivity, of heat and electricity, and resistance to decomposition. These properties make mica indispensable in the electrical trade, which consumes most of it. Only one producer reported a greater output of stove mica than of electrical mica. The output of electrical mica of the other producers shows percentages ranging from 76 to 100 of their total output of cut sheet mica. Cut stove mica brings a much higher price—from \$1.50 to \$3.33 a pound; the corresponding price for cut electrical mica is 9 cents to 74 cents a pound. Mica is sometimes called isinglass when it is used in glazing, but true isinglass, although resembling mica is some of its properties, is a gelatinous substance made of the air bladders of certain fish, is soluble in boiling water, and burns readily, whereas mica is not combustible.

These facts are pointed out by W. T. Schaller of the Geological Survey. He says further:

The brilliancy of small scales of mica has made them valuable in the decorative arts, and hence ground mica is used extensively for the decoration of wall paper, to which it adds luster and brightness.

The crystals of mica are rough blocks, hexagonal if complete, or the mineral may occur in sheets of no regular shape, though perhaps one or two of the six sides of the crystal may be seen. The black, brown, or red inclusions of iron oxide—the "specks"—are in some crystals arrayed in straight lines, which are either parallel to or bisect the edges of the crystal.

The rough blocks or crystals of mica, as mined, must be freed from adhering rock and split into thin sheets, which are rough trimmed with a knife, and the mica is then graded for size and quality. The rough blocks, as obtained from the mines, yield only about 10 per cent of finished trimmed sheet mica ready for use in the electrical and glazing trades. The remainder is scrap mica, suitable only for grinding. A few crystals have been reported to yield as high as 80 per

cent of trimmed sheets, but this yield is unusually large.

The average yield of cut sheet mica, ready for the trade, from run-of-mine mica, as deduced from the reports of the producers, is 17 per cent for New Hampshire, 10 per cent for South Dakota, and about 9 per cent for Virginia and for North Carolina. The average yield for the United States, as calculated from the reports of 15 producers, is about 11 per cent, the limits being 2 and 33 per cent, respectively; the average for the United States, as calculated from the total production, is 7 per cent. The Arizona State Bureau of Mines has published a bulletin on mica in which is given a "flow sheet" from a New Hampshire mica mine, showing the quantities and values of mica in each 1,000 pounds mined used for different purposes. The yield of sheet mica, about 30 per cent, is much higher than the average for any single State.

The thin sheets of mica used in the trade are colorless. Muscovite in thin sheets is called clear or white mica; in sheets sufficiently thick to show a decided color, usually more than one-sixteenth of an inch, it is amber, yellow, green, brownish red or "rum," red or "ruby," smoky, gray, or brown. Phlogopite in thin sheets is generally yellowish or brownish; in thicker sheets it is yellow, brown, black, or coppery. Biotite is black and dark brown or green in thin sheets. "Specked" mica contains inclusions of dark minerals, mostly some form of iron oxide.

FIND HICKORY NUTS OLDER

THAN THE PYRAMIDS

Among the fossils recently discovered by the United States Geological Survey, Department of the Interior, are remarkably well preserved impressions or casts of leaves of several extinct varieties of ash, oak, beech, and hickory, which were found, along with three present-day species, in States bordering the Gulf of Mexico. Although the leaves themselves have rotted and gone, here and there some were buried in soft clay by sediment in such a way as to leave perfectly preserved casts. The nuts, on the other hand, neither decayed nor petrified, but fell into pools of stagnant water, which is one of the best preservatives in nature, and sooner or later were also buried under silt and clay. Owing to their hard coats, those which fell into places favorable to their preservation are today in excellent condition, though slightly flattened by the long soaking and the gentle pressure of the clay. The deposit in which the leaves and nuts are found is not less than a million years old, or at least a hundred times as old as the pyramids of Egypt.

The report containing descriptions and reproductions of photographs of these fossil remains (Professional Paper 98-L) is purely technical, and may be obtained from the Director, Geological Survey, Washington, D. C.

FIELD ASSIGNMENTS IN MINING STATES ARE ANNOUNCED

Field assignments just have been made by the U. S. Geological Survey, in the principal mining states as follows:

ALABAMA

Study of red iron ores, E. F. Burchard.
Graphite deposits of Clay County, E. S. Bastin.

Texture and composition of marbles, T. N. Dale.

Description of coal field, Charles Butts.
Stratigraphy and paleontology of the upper Eocene and lower Oligocene formations, C. W. Cooke.

Structure studies of favorable localities for oil and gas accumulation, G. C. Matson, O. B. Hopkins.

Fossil foraminifera, J. A. Cushman.

Measurement of stream flow, W. E. Hall.

ALASKA

General geologic investigations, Alfred H. Brooks.

Investigation of water powers in cooperation with Forest Service, G. H. Canfield.

Geologic reconnaissance and investigation of mineral resources, Theodore Chapin.

Detailed topographic survey, D. C. Wither-
spoon.

Detailed geologic survey and study of mineral resources, A. C. Spencer, H. M. Eakin, F. H. Moffit.

Geologic reconnaissance surveys and investigation of mineral resources, J. W. Bagley.

Topographic reconnaissance surveys, B. L. Johnson.

Geologic reconnaissance surveys and study of mineral resources, G. C. Martin, R. M. Overbeck, A. G. Maddren.

Detailed geologic surveys and study of mineral resources, C. E. Giffin.

Topographic reconnaissance survey; geologic reconnaissance survey and investigation of mineral resources, S. R. Capps.

Investigation of ore deposits; investigation of placer deposits, J. B. Mertie, Jr.

Investigation of placer deposits, J. B. Mertie, Jr.

Geologic and topographic reconnaissance surveys and investigation of mineral resources, R. H. Sargent, G. L. Harrington.

Investigation of ore deposits, J. B. Mertie, Jr.

ARIZONA

Areal geology for folio, C. H. Clapp.

Areal geology for papers and folios, L. F. Noble.

Geology of copper deposits, F. L. Ransome.

Revision of folio map and text, C. F. Tolman, Jr.

Gypsum deposits, R. W. Stone.

Placer deposits near Congress, Weaver, Prescott, and Quartzite, J. M. Hill.

Topography, topography revision, to be assigned.

Measurement of stream flow, C. E. Ellsworth, M. D. Anderson, J. B. Spiegel.

CALIFORNIA

Areal geology, F. C. Calkins, F. E. Matthes.

Study of pegmatite dikes, W. T. Schaller.

Study of eruptive activity, J. S. Diller.

Preparation of folio text, F. L. Hess.

Graphite deposits, E. S. Bastin.

Detailed mapping of geology and ore deposits, J. F. Hunter, Jr.

Conclusions of field examination for folio publication, J. S. Diller.

Report on copper deposits of Shasta County, L. C. Graton.

Mineralogy of tourmaline deposits, W. T. Schaller.

General geology of southern California bordering Mexico, R. T. Hill.

Areal geology and oil pools, W. A. English, W. S. W. Kew.

Structure of productive oil fields, Lost Hills-McKittrick region, R. W. Pack, W. A. English.

Study of effect of water on oil, G. S. Rogers.

Completion of mapping and revision of text for folio, C. E. Weaver.

Topography and control, R. T. Evans, N. E. Ballmer, J. H. Le Feaver, R. Reeves, R. M. Wilson, L. F. Biggs, E. P. Davis, C. A. Ecklund, J. P. Harrison, C. P. McKinley, L. F. Biggs.

Measurement of stream flow, H. D. McGlashan, F. C. Ebert, Charles Leidl, C. J. Emerson, J. H. Morgan, H. M. Stafford.

Measurement of ground-water levels, W. O. Clark.

Supplementary ground-water survey, G. A. Waring.

Ground-water survey, W. O. Clark.

Study of physiographic effects of recent floods, O. E. Meinzer.

Survey of water in valley fill, C. H. Lee.

Measurements of ground-water levels, F. C. Ebert.

Ground-water reconnaissance, G. A. Waring.

COLORADO

General geology with special reference to igneous activity, Whitman Cross, E. S. Larsen, Jr., J. F. Hunter, Jr.

Glacial and postglacial deposits, W. W. Atwood, K. V. Mather.

Classification of coal land, C. E. Leshner.

Investigation of oil shale, D. E. Winchester.

Metallographic study of ores, F. B. Laney.

Enrichment of silver ores, E. S. Bastin, Chase Palmer.

Description of Eocene flora, F. H. Knowlton.

Physiography of Rocky Mountain National Park, W. T. Lee.

Classification of coal land from Coal Basin to Crested Butte, E. R. Lloyd.

Examination of Tertiary and Cretaceous deposits on flanks of Rocky Mountains, W. T. Lee.

Paleontologic studies of Paleozoic sections, Edwin Kirk.

Popular guidebook to Mesa Verde National Park, M. R. Campbell.

Completion of monograph on geology and ore deposits, G. F. Loughlin.

Topography and control, Basil Duke.

Topography, C. L. Nelson, Basil Duke.

Measurement of stream flow, Robert Follansbee, W. R. King, H. K. Smith, P. V. Hodges.

IDAHO

Preparation of folio text, L. G. Westgate.

Classification of phosphate lands, G. R. Mansfield, P. V. Roundy.

Study of geology and ore deposits of the Coeur d'Alene district, J. B. Umpleby, E. L. Jones, Jr.

History of mining developments, W. P. Jenney.

Reconnaissance of ore deposits of Pine Creek, Deadwood, and Fort Hall districts, J. B. Umpleby, E. L. Jones, Jr.

Topography, C. G. Anderson, Albert Pike, E. M. Bandli, H. E. Burney.

Control, T. M. Bannon.

Measurement of stream flow, G. C. Baldwin, A. W. Harrington, L. W. Roush.

MONTANA

Summary report on coal fields, M. R. Campbell and others.

Yellowstone Valley above Billings for structures favorable for occurrence of oil, E. T. Hancock, W. T. Thom, Jr., J. D. Sears.

Musselshell Valley above Round-up for structures favorable for occurrence of oil, C. F. Bowen, W. P. Woodring.

Classification and mapping of metalliferous deposits and phosphate lands in Philipsburg-Melrose area, J. T. Pardee.

Classification and mapping of phosphate lands between Helena and Yellowstone Park, D. D. Condit, E. H. Finch.

Classification and mapping of small areas of phosphate lands and metalliferous deposits, A. R. Schultz.

Investigation of oil-bearing formations in Tejon County, Eugene Stebinger, M. I. Goldman.

Glacial deposits, W. C. Alden.

Reconnaissance mapping for land classification, A. J. Collier, H. R. Bennett.

Classification of coal lands, A. J. Collier.

Geology and classification of lands in Crow Indian Reservation, C. H. Wegemann, R. W. Howell, C. K. Wentworth.

Topography and control, K. W. Trimble.

Topography, R. C. Seitz, J. E. Blackburn, R. C. Seitz, J. W. Muller.

Control, G. T. Hawkins.

Measurement of stream flow, W. A. Lamb, A. H. Tuttle.

Ground-water survey, A. J. Ellis.

NEVADA

Potash and nitrate prospects, H. S. Gale. Examination of sediments from drill samples, M. I. Goldman.

Detailed mapping and study of gold deposits, H. G. Ferguson.

Report on occurrence of tin near Elko, Adolph Knopf.

Topography, H. H. Hodgeson, T. P. Pendleton.

Measurement of stream flow, C. C. Jacob, A. B. Purton, L. W. Jordan, J. J. Sanford, W. E. Dickinson.

Ground-water levels and percolation, W. O. Clark.

Ground-water survey, G. A. Waring.

NEW MEXICO

Summary description of coal fields, M. R. Campbell, W. T. Lee, and others.

Special geologic studies, Kirk Bryan.

Gold placer deposits near San Pedro, J. M. Hill.

Detailed examination of Mongollon gold district and reconnaissance of Steeple Rock metal mining district, H. G. Ferguson.

Classification of coal lands, M. R. Campbell.

Report on copper deposits, A. C. Spencer.

Reconnaissance survey of coal field, J. B. Reeside, Jr., F. R. Clark.

Reconnaissance of "Red Beds" saline deposits, N. H. Darton.

Study of zinc deposits, G. F. Loughlin.

Topography revision, O. G. Taylor.

Topography and control, to be assigned.

Topography, C. C. Gardner.

Preliminary study of artesian basin and experiments in measuring flow in artesian wells, O. E. Meinzer.

Measurement of stream flow, Robert Follansbee, W. R. King.

PENNSYLVANIA

Examination of feldspar deposits, F. J. Katz.

Summary description of anthracite region, Baird Halberstadt.

Summary description of bituminous coal fields, G. H. Ashley.

Detailed mapping, G. B. Richardson, R. V. A. Mills.

Completion of folios, G. H. Ashley.

Folio description, G. H. Ashley.

Topographic revision, J. I. Gayetty.

Studies of valley formations, G. W. Stose.

Detailed mapping, E. F. Bliss.

Completion of folio, Charles Butts.

Detailed mapping and completion of folio, H. B. Kümmell.

Topography, D. Hannegan.

UTAH

Geology and ore deposits of State, B. S. Butler, G. F. Loughlin.

Examination of gypsum deposits, R. W. Stone.

Summary report on coal fields, M. R. Campbell and others.

Measurement and field tests of oil shales, D. E. Winchester, W. B. Wilson.

Geology and ore deposits of Cottonwood and American Creek districts, B. S. Butler, F. F. Hintze.

Paleontology of early Paleozoic formation, Edwin Kirk.

Classification of coal lands, E. R. Lloyd.

Completion of folio, F. R. Clark.

Topography, G. Young.

Classification of land in regard to domestic water supplies, G. A. Waring.

Measurement of stream flow, C. C. Jacob, A. B. Purton, L. W. Jordan, J. J. Sanford, W. E. Dickinson.

CHIEF ENGINEER RICE ON IMPORTANT INSPECTION TRIP

An important trip of inspection and investigation is being made by George S. Rice, chief mining engineer of the Bureau of Mines. Mr. Rice left Washington the middle of September. He visited the Cleveland tunnel and spent several days in consultation with city officials at Milwaukee with regard to the problem arising from driving a tunnel under the lake at that point. He is now in the iron district of Minnesota.

Early this month Mr. Rice will arrive in Butte, where he will familiarize himself, from first-hand knowledge, on the work being carried on by Daniel Harrington and Dr. Anthony J. Lanza. In addition to the study which they are conducting as to the causes of tuberculosis among miners, they are investigating the effect of temperature and humidity on the effective working power of men in mines.

While in Butte Mr. Rice intends to pay particular personal attention to the problem of ventilation in deep and remote workings. This problem is particularly acute just now in Butte mines, especially in workings adjacent to old fire areas.

From Butte Mr. Rice expects to go directly to Seattle, where he will look into the problem which has arisen in gold mines in that district. Numerous mines are being troubled by so-called "bumps." These phenomena are supposed to be due to the pressure of rocks.

At San Francisco Mr. Rice will acquaint himself with the progress of the cooperative work between the Bureau of Mines and the Industrial Accident Commission of California. He will also consult with Edward Higgins, who has been in charge of the Bureau of Mines' work in California. One of the questions which will be considered at San Francisco is the matter of a successor to Mr. Higgins, who has resigned. Since the position comes under the civil service only persons who have taken special examinations for this place can be considered for it. Several western metal mining engineers have been certified by the civil service commission

as possibly qualifying for the place and Mr. Rice will confer with them personally.

Mr. Rice expects to reach San Francisco the latter part of October and will return to Washington the middle of November.

MINERALS SWELL TONNAGE PASSING THROUGH CANAL

Minerals continue to form a considerable proportion of the tonnage passing through the Panama Canal. Antimony is moving from Yokohama to New York and from Antofagasta to Liverpool. Borax is moving from Liverpool to northern Pacific ports, from New York to New Zealand and Australia, from Antofagasta to Liverpool and to Havre.

Coal is moving from Norfolk and Baltimore to Antofagasta, Guayaquil, Iquique, Punta Arenas and Callao. The United Kingdom seems to be furnishing most of the coal for Chilean ports.

Other minerals are moving as follows:

Copper and copper ores, Callao to New York; Antofagasta to New York; South Pacific Islands to Liverpool, Yokohama, New York, Lota, Liverpool, Kobe, to New York. Acapulco to New York, Chilean ports to New York and Liverpool.

Coke from Norfolk to Punta Arenas, Glasgow to Santa Rosalia.

Iron and iron ores, United Kingdom to Chile, Copenhagen to Shanghai, Norfolk to Punta Arenas, Chilean ports to Philadelphia.

Nitrates from Chilean and Peruvian ports to San Francisco, Rotterdam to Liverpool, Hampton Roads to New York, Philadelphia, Norfolk, Glasgow, Baltimore, New Orleans and Pensacola.

Crude iron from San Francisco to Ecuadorian and Peruvian points.

Gold and silver (small shipments) from Pacific ports of Central America and from Callao to New York and Liverpool.

STATE SURVEYS PREPARE TO EXAMINE OIL SHALES

Four states are expected soon to undertake, through their Geological Surveys, an important examination of oil shales. The important work which has been done by the Geological Survey and Bureau of Mines in the examination of these hydrocarbon shales is attracting wide attention. By distilling these shales on the ground it has been possible to gather much additional information with regard to their value as sources of oil and gas.

Owing to the increasing possibility that these oil shales may be exploited commercially in the near future the State Surveys in question are preparing for extended examinations, it is understood.

MICA DEPOSITS OF IMPORTANCE OCCUR IN MANY STATES

Mica is widespread in its occurrence and is one of the commonest minerals, says Waldemar T. Schaller, of the U. S. Geological Survey. It is found in many igneous rocks, in a large proportion of metamorphic rocks—as, for example, mica schist—and in many secondary rocks such as sandstone and shale. The natural processes of change which turn the feldspars of rocks into clay have but little effect on mica, which finds its way into the resulting sands and clays that are later consolidated into the sedimentary rocks—sandstones and shales. These bright, shining specks or scales of mica are often mistaken for gold or other valuable mineral, particularly if the original mica was biotite instead of muscovite, for much of the iron-bearing biotite assumes a golden-yellow or brownish color in its weathered forms.

The mica scales in the sandstones and shales are too small and too scarce to be of any commercial value. Many of the metamorphic rocks, such as the schists and gneisses, contain more mica than sandstone or shale, but the small size of the mica scales and the presence in abundance of quartz and other minerals has so far rendered such occurrences of doubtful value. Some mica schists or sericite schists (fine, shreddy muscovite is called sericite) that consist almost entirely of mica, with practically no quartz or other harder mineral, may be valuable. Quartz is so commonly associated with mica in metamorphic rocks that it seems doubtful whether any large bodies of sericite schist can be found that would be workable at a profit if mica should be the only product obtained. Sericite, as is noted by Rogers, may be a low temperature modification of muscovite; it may be a dimorphous form and therefore a distinct species.

A small quantity of fresh pegmatite rock containing mica in scales larger than those of the metamorphic schists but still too small to be used otherwise than as scrap for grinding has been crushed and the mica extracted from it. Mica has also been concentrated from the residue of a clay plant that worked an altered pegmatite rock for its clay content, which was a product of decomposition of feldspar.

Mica forms about 4 per cent of all igneous rocks, but sheet muscovite can be extracted commercially only from pegmatite. Pegmatite is a rock similar to granite in chemical and mineral composition, but has a more variable and coarser texture. It occurs in irregular-shaped masses, streaks, lenses, or sheets called veins or dikes, which vary many feet in both length and thickness. The surrounding rock is generally geologically very old, much of it changed to a gneiss or schist, the directions of whose structural features

have had a large influence on the direction of the pegmatite sheet. In some mines the muscovite is concentrated in one or more well-defined layers or bands near the edges of the pegmatite, but more commonly it is scattered unevenly through the pegmatite, or the mica crystals may occur as individuals or in clusters scattered irregularly through the rock.

The occurrence of mica in sheets several feet in width makes it particularly valuable. Individual crystals 2 feet wide are not rare, and crystals 1 foot wide are common. A crystal from New Hampshire was 28 inches wide and 4 feet 2 inches long; another fine crystal was 2 feet wide and 2 feet long. Two crystals from North Carolina measured, respectively, 33 by 32½ inches and 33½ by 29½ by 17½ inches. Muscovite crystals 10 feet across the cleavage plane are reported to have been found in the Nellore district, India. Phlogopit has been reported from the Canadian mines in crystals 5 feet wide and nearly 10 feet long, weighing about a ton and a half. Mr. M. F. Westover, of the General Electric Co., states that one crystal measured 119 inches in width. It is of interest to record the gift of a section of a crystal of phlogopite from a mine near Sydenham, Ontario, Canada, to the United States National Museum, where the specimen is on public exhibition. The gift was made by Mr. Westover, through the United States Geological Survey. The section, which is somewhat less than an inch thick, measures 47 by 35 inches across the cleavage face. Crystals so large are very exceptional, few exceed 2 feet across the cleavage faces.

The United States, Canada, and India are large producers of mica, and it is also obtained from German East Africa, Brazil, South Africa, Ceylon, Norway, China, Japan, Argentina, and South Australia. Deposits that may be of value have been reported from several other countries.

Mica deposits of probable value have been found in about half the States of the United States. The principal producing States have been North Carolina, New Hampshire, South Dakota, Idaho, New Mexico, Colorado, Virginia, South Carolina, Alabama, and Georgia.

TREASURY DEPARTMENT MODIFIES RULE FOR APPRAISEMENT OF ZINC

Appraisement of zinc at customs houses has been ordered modified. The Treasury Department has issued this statement in that connection:

"The plan for the appraisement of zinc in ore, published in T. D. 36446, is hereby modified, to provide that the method therein set forth shall not apply to sulphide ores assaying 40 per cent or less of zinc. The zinc in such ores should be appraised at not less than the contract or purchase price."

NAVY'S GREAT NEED OF OIL JUSTIFIES NATION IN HOLDING RESERVES, ENGINEERS SAY

**Seventy New War Vessels Will Burn Oil—New Battle Cruisers Will Develop
180,000 Horsepower Each—New Ships Alone Will Require 116,000
Barrels Daily if Run at Full Speed.**

The conservation of the naval oil reserves, which is ardently advocated by Secretary Daniels, is easily understood to be necessary, in the opinion of the engineers of the navy and coast-guard service, when the huge building program of oil-burning vessels for the government is held in mind. The vast amount of oil that will be required to operate the vessels already authorized makes it necessary for the government to own and control its own oil fields, they say.

Hereafter all of the naval vessels, the coast-guard vessels and such ships as may be constructed for the use of the army are to be oil burners. In the naval appropriation law for the fiscal year provision is made for the construction of seventy vessels immediately, all of which will burn oil.

For the first time in the history of the navy, battle cruisers have been authorized with such tremendous horsepower. Each of these warships is to have 180,000 horsepower. The greatest provided in any vessel in the United States Navy at present is 32,000.

Four of these battle cruisers are to be begun immediately, with a total horsepower of 720,000; four battleships are authorized with a total horsepower of 140,000; four scout cruisers with a horsepower of 240,000; twenty torpedo boat destroyers with a total estimated horsepower of 240,000; twenty-eight submarines with a total estimated horsepower of 28,000; three fuel ships with a total estimated horsepower of 29,000; one repair ship with an estimated horsepower of 8,000; one transport ship with an estimated horsepower of 8,000; one hospital ship with an estimated horsepower of 8,000; two munition ships with an estimated horsepower of 16,000; two gunboats with an estimated horsepower of 4,000. The total horsepower estimated for these vessels is 1,436,000, or in round numbers 1,500,000.

ESTIMATED OIL CONSUMPTION

One pound of oil will create one horsepower an hour, according to the estimates of the engineer officer. They figure that these seventy vessels just authorized for the navy, if run at speed, in a day will consume 36,000,000 pounds of oil. Estimating 310 pounds to a

barrel, these vessels will consume 116,000 barrels of oil a day. Roughly estimating the price of oil at \$1.50 a barrel, to drive these vessels at speed for one day it will cost the government \$174,000.

In the case of the battle cruisers, with their 180,000 horsepower each, running at full speed, such a cruiser will consume 4,320,000 pounds of oil, or 14,000 barrels, in a day. Each of these new battle cruisers when completed must be a veritable oil well. It is planned to have a sufficient supply aboard for a twelve-day cruise at full speed, or about 150,000 barrels. These vessels, with such a supply of fuel can easily cross the Atlantic and return and still have fuel left.

The coast guard service this year was authorized by Congress to build eight new vessels, all of which will burn oil or gasoline. While the use of fuel oil by the coast guard service cannot compare in volume to its use by the Navy, still it will be appreciable.

ANNOUNCES TOTAL FOR 1917

The Bureau of Supplies and Accounts of the Navy Department has completed estimates of the fuel oil consumption of the United States Navy for 1917, and announced a total of 50,000,000 gallons. It is expected that the demands of the Government for fuel oil for its vessels will increase as the years go on. It is estimated that the United States controls 60 per cent of the total supply of the world. If Mexico were included in this estimate it would bring it up to about 75 per cent of the total supply. The geological survey has figured that there is at present in sight in the United States a sufficient supply of oil to meet all the demands for the next sixty years, allowing for an increase in the use of oil and gasoline each year.

The use of oil as fuel for vessels is bringing about a great saving of the Government's money, it is stated, and also makes it possible to increase the speed of the vessels. In the first place oil costs less than coal for the power derived. In the second place, it enables the vessels to operate with smaller crews. In the third place, it brings about a great saving in the amount of paint used, for the coal-ing of naval vessels frequently makes new painting necessary.

VESSELS COMMITTED TO USE OF OIL

In constructing these oil burners, the Navy and the coast guard service are committing the vessels to the use of that fuel during their life. For while it has been possible to convert coal-burning vessels into oil burners, it is said that it would be absolutely impossible to convert an oil burner into a coal burner.

It is planned to store part of the fuel oil in these new vessels in the five or six "skins" which will run in parallel layers below the water line, and which are designed to protect the new vessels from torpedoes launched by submarines. The naval engineers believe that these "skins," which are in reality separate bottoms, will effectively protect a vessel from a torpedo.

Pending before Congress is the Phelan oil-land-leasing bill, which the conservationists insist will deplete the naval oil reserves if enacted into law. It is expected that a hard struggle over this measure will develop in the Senate when that body meets in December. The Democratic caucus of the Senate has agreed that the measure shall be taken up then.

CAMELS ONCE RAN WILD IN STATE OF MISSISSIPPI

The geology of mountain regions is generally more difficult to master than that of plains because the rocks have been more broken and tilted about, but the geology of certain parts of Mississippi is almost as difficult as that of a mountainous region because certain widely distributed formations bear few definite identification marks, particularly remains and impressions of plants and animals that lived at the time they were formed. A peculiar southern sandstone, which geologists have called the Catahoula sandstone, has been studied with care by G. C. Matson and E. W. Berry, of the United States Geological Survey, Department of the Interior, who have been able to identify and follow the stratum by means of the remains of plants. Among the plants found were pines, ferns, leaves of date palms, tropical myrtles, figs, and a tree closely related to the present-day Mexican and Central American sapota, from which most of the material for chewing gum is obtained. These fossil plants show that at the time the sandstone was formed—perhaps ten million years ago—the climate of this region was tropical, and bones of camels found by other geologists and the similarity of the sand composing the sandstone to certain tropical desert sands have a similar implication. The report describing these fossil remains (Professional Paper 98 M) is purely technical. A copy may be obtained from the Director of the Geological Survey, Washington, D. C.

IMPROVEMENT NOTED IN MID-CONTINENTAL FIELD

(Special correspondence.)

Tulsa, Okla., September 25.—The oil conditions in the mid-continent field are improving. The pipe lines are running more production than last month and it is rumored that all of the production on the connections to the pipe line in the mid-continent fields will soon be run to full capacity and that the oil market will soon react and that the price will begin to climb upward once more. The oil producers look for a \$2 a barrel price for their crude by early summer of next year.

Drilling has become more active and some good wells have recently been reported in the Augusta pool in Kansas.

Many locations are being made in Oklahoma and Texas. Leases are becoming active once more and their values are beginning to increase. Some good sales for production of properties have recently been reported, among which is the Clabrowl, about six miles northeast of Tulsa, which was sold to eastern parties for \$175,000 cash. This property embraces about 700 acres and about seven wells in that red fork sands about 1,200 feet deep. The daily production is about 250 barrels a day and new production, as a majority of these wells were drilled in June, July and August.

In the Headton, near Ardmore, Okla., several good properties have changed hands on a basis of \$400 to \$500 per barrel settled production, thirty days' pipe line runs.

A good many small refineries are being begun in this section, especially skimming plants and casing-head gas plants; among the last constructions is the new plant of the T. B. Gasoline Company, at Chelsea, Okla.

The Walker interests are also beginning a casing-head plant at Chelsea.

The White Oil Company recently drilled in a well in the Chelsea field, which shows 22 feet of oil-bearing sands. This well was considered a wild cat and opened up a new district in the Chelsea field and extended the field about two miles north and east. The White Company also recently drilled in a good well in the Sageeyah field, five miles north of Claremore, which shows 48 feet of oil-bearing sand, depth, 1,000 feet, and considered one of the best wells in this field.

The Starky Oil & Gas Company recently drilled in a good gasser at Chelsea, which, in conjunction with the White Oil Company, also extended the Chelsea field.

The Albemarle Producing Company has just spudded in its well to drill on a 900-acre block, 6 miles south of Chelsea, and as this is a wild cat, this well is being watched with much interest and if same comes in a producer it will open up an entirely new field in the Chelsea district.

The larger companies are reporting some good producers in their different fields in this section.

Latest Legal Decisions

RIGHT TO ENFORCE

The owner of an undivided seven-eighths interest in an oil and gas lease entered into a contract with the owner of the one-eighth interest by the terms of which such owner of the seven-eighths interest was to furnish all derricks, casings, tanks, tubing and all other machinery and supplies, and to furnish all labor and pay all expenses incident to completing operating wells for oil and gas on the leased premises; and the owner of the one-eighth interest agreed to pay one-eighth of all amounts expended under the contract. Pursuant to the contract the owner of the seven-eighths interest did furnish derricks, casing and other material and oil-well supplies used upon the leased premises for the purpose of developing and operating the lease and made payment for labor, in all, to the amount of more than \$2,000. Under these facts the owner of the seven-eighths interest cannot enforce a lien upon the one-eighth interest of his co-tenant under the revised laws of Oklahoma (Sec. 3865), which provide that any person who shall under contract with the owner of any leasehold for oil and gas purposes, perform labor or furnish material, shall have a lien therefor, for the reason that the contract made between the co-tenants was for the purpose of the development of their common property, and was not a contract with the owner of an oil or gas lease for the drilling of wells or the furnishing of the materials therefor as contemplated by the statute. The work done and materials furnished were for the improvement of the common property, and while under the contract between the co-tenants and the co-tenant performing the work and furnishing the materials is entitled to contribution from his co-tenant in proportion to his interest to reimburse him for monies expended in making such improvements, but he is not entitled to enforce a mechanic's lien therefor upon the undivided one-eighth interest of his co-tenant.

Uncle Sam Oil Co. *vs.* Richards (Oklahoma), 158 Pacific, 1187, p. 1189.

OPTION OF LESSEE

Where an oil and gas lease does not fix the number of wells to be drilled for the development of the premises as contemplated, the lessee then has the right to determine the number of wells or the extent of the development and his decision is conclusive on this subject so long as he acts honestly and in good faith upon sound business principles.

Gilbert *vs.* Boles (Indiana App.), 113 North-eastern, 379, p. 380.

PROSPECT HOLE LIABILITY

The value of a prospect hole for oil, caused to be drilled by a lessee of oil and gas lands, but not completed, is not dependent upon the fact that it may be dry or may be a productive well and its value in case of its destruction by want of ordinary care upon the part of a person in charge of some duty to the owner in relation thereto is ordinarily measured by the amount necessary to bring it to the point where such destruction occurred. A person guilty of negligence, or even of wrongdoing resulting in the destruction of a prospect hole cannot be charged with the entire cost of completing such hole if it had been abandoned as worthless, but where the prospective value has not been and cannot be determined the situation is different. The lessee or owner has a right to expend his money in drilling such a prospect hole or well to the depth which he desires without the neglect or wilful interference of a third party and the fact that the venture may ultimately become a loss to him is no defense to an action against persons charged with the neglect or willful destruction of such a prospect hole. The value of such a prospect hole, the value of which as an oil and gas well is not determined, is the amount necessary to bring such hole or well to the point where its completion was wrongfully prevented and the damages would necessarily be the expenditures incurred under the contract for the drilling of the same, plus the amount necessary to complete the hole according to the terms of the contract, above the amount agreed to be paid the contractor for any further drilling, less any amount due the drilling contractor for the work done under the contract; but if the hole or well is destroyed either by the negligence or the want of ordinary care on behalf of the driller, and the drilling of a new hole becomes necessary in order to complete the contract, then the cost of drilling such new hole is an element of the amount necessary to complete the hole according to the terms of the contract for further drilling, as any such further drilling cannot be done without a hole of the original depth with which to start.

North Healdton Oil and Gas Co. *vs.* Skelly (Okla.), 158 Pacific, 1180, p. 1182.

NEGLECTANCE OF FELLOW SERVANT

Where a mine operator fails to furnish his employees and miners a safe place, machinery, tools or appliances, and as a result of such failure a miner is injured, the fact that the negligence of a fellow servant commingled with such failure on the part of the operator will not exonerate the operator from liability.

Bartlesville Zinc Co. *vs.* Prince (Oklahoma), 158 Pacific, 622, p. 628; June, 1916.

SALT LAKE VALLEY SMELTERS TO BE ENLARGED MATERIALLY

Salt Lake City, Sept. 23.—Relief of lead, silver, and copper producers of Utah who have been suffering for the last three months on account of congestion of the Salt Lake valley smelters, is promised in a statement made public September 1 by C. W. Whitley, general manager of the American Smelting and Refining Company. Mr. Whitley said that within six months the capacity of the company's Garfield smelter would be doubled, giving it a capacity of 800 tons of copper every 24 hours. He also says that within the same period the Murray plant of the company would be so enlarged as to enabled it to handle all the lead ores offered. The furnaces will be enlarged and improved and a new stack 450 feet high will be built. Plans for the improvements are completed and some of the material is already on the ground.

The two plants employ about 3,000 men and this force will necessarily be increased to handle the new construction and the increased volume of business that will follow it.

BUREAU OF MINES PLANS IMPORTANT OIL WORK

During the current fiscal year some very important work will be done by the Bureau of Mines in its petroleum division. This work has been divided under the following heads:

Special investigation of oil shales.

Analysis and tests of fuel oil belonging to the United States.

The study of the most efficient drilling methods with a view to reducing underground waste.

The study of the most efficient method of storing and transporting petroleum.

The extraction of gasoline from gas, and the refining problems from an engineer's standpoint with a view to reducing waste and loss incident thereto to a minimum.

The study of the most efficient methods of utilizing petroleum and its products and the chemical problems relating to refining and treatment.

OVER 20,000,000 ACRES OF COAL LANDS HAVE BEEN RESTORED

A summary of principal withdrawals and restorations during the period March 4, 1913, to August 31, 1916, is as follows (in acres):

	Outstand- ing With- drawn Mar. 4, 1913	With- drawn During Period	Restored During Period	Outstand- ing With- drawn Aug. 31, 1916
Coal	65,410,464	668,664	20,600,041	45,479,087
Oil and gas	4,817,709	1,496,011	692,557	5,621,160
Phosphate	3,367,378	459,601	1,850,581	2,506,398
Potash ...	133,829	211,354	214,584	130,629
Power site	1,837,258	620,991	192,816	2,367,433
Public water	86,216	112,394	2,702	195,908
Total	75,672,851	3,671,045	23,053,281	56,200,615

BURCHARD TO VISIT IRON, LEAD AND ZINC DEPOSITS

E. F. Burchard of the Geological Survey will leave early this month to start field work, which will be under the immediate charge of T. Nelson Dale, in the marble deposits of eastern Alabama and northwestern Georgia. While in Alabama, Mr. Burchard will visit certain iron ore deposits, including the gray iron ores of Talladega County. These ores will be sampled with reference to their potash content. About the middle of October Mr. Burchard plans to go to northwestern Arkansas to make a field investigation of the recent development of zinc and lead in that region.

The results of the investigation in Arkansas will be supplemental to a report on this district written by Adams and Burchard as professional paper No. 24 in 1904.

LARSEN STUDIES GEOLOGICAL HISTORY IN COLORADO

After a detailed reconnaissance of certain volcanic rocks of Colorado, E. S. Larsen, Jr., has returned to Washington to make his report. Mr. Larsen states that some mining activity is in evidence in the section where he has been devoting his principal time to the study of geological history. Some ore is being shipped from the Beidel region, where considerable prospecting is being done on gold and silver-bearing veins. There is also some prospecting being done on manganese deposits. At Summer Coon there is a deposit of iron ore which is attracting some attention from prospectors.

During his investigation this summer, Mr. Larsen found considerable quantities of the rare mineral gerskutsite and of the new mineral credite. This latter mineral was discovered by Mr. Larsen.

NICKEL NEARLY ALWAYS FOUND WITH DARK IGNEOUS ROCKS

Nickel is seldom found except in association with the dark igneous rocks, that is, with those rocks which have been melted and which contain comparatively little quartz. It is found with serpentines, peridotite (a rock made up largely of olivine). The great deposit at Sudbury, Ontario, is in a granular rock called norite. At Sudbury the norite contains great quantities of the iron sulphide known as pyrrhotite. This is the iron sulphide which is attracted by a magnet. The ordinary iron sulphide, pyrite, is not. At Sudbury the ore is also accompanied by a considerable quantity of copper minerals.

New Law Serial Out

The Bureau of Mines has just issued its eighth law serial on "Abstracts of Current Decisions on Mines and Mining." Copies of these may be had on request to the Bureau.

PERSONALS

John A. Rice, who is operating the Curry Mines at Silver Center, Ontario, was a recent Washington visitor. He has gone to Utah, where he will spend a month looking over mining properties. Afterwards he will visit other states in the Southwest.

Kirby Thomas, a mining engineer of New York City, paid a business visit to Washington last month.

A. R. Shepard, son of former Governor Shepard, of the District of Columbia, who is operating tungsten mines near Ragan, Nevada, is in Washington visiting relatives.

Mr. Shepard formerly was manager of the Batopilas mines in Mexico, but owing to the interruption of railroad transportation these mines have been doing very little work for the past several years.

E. O. Ulrich, paleontologist with the U. S. Geological Survey, has returned from four months' field work in Illinois and New York.

Max W. Ball is acting as chief clerk of the Bureau of Mines during the absence of F. J. Bailey, who is taking military training at Plattsburg.

Carl H. Beal, a graduate of Stanford University, has joined the petroleum force of the Bureau of Mines. Mr. Beal has been doing technical work in Oklahoma for the past two years.

John Johnston, who has been connected with the Geophysical Laboratory of the Carnegie Institute, has resigned to accept a position on the technical staff of the American Lead and Zinc Smelting Co., of the Joplin district.

W. R. Weigle, of Philadelphia, who is operating a uranium mine near the Paradox Valley and other mines in Colorado, was in Washington recently on business connected with the Land Office.

H. D. McCaskey, chief of the mineral resource division of the Geological Survey, is on a trip of inspection and investigation on the Pacific coast. He will investigate several of the quicksilver deposits in that portion of the country.

Judge Joseph W. Thompson, the head of the legal division of the Bureau of Mines, has returned from a month's vacation spent at Mountain Lake Park, Maryland.

J. A. Davis, the mining engineer who will have charge of the new experiment station at Fairbanks, is enroute to Fairbanks, where he will conduct a preliminary survey looking to the establishment of the station.

Max W. Ball of the Bureau of Mines is visiting Colorado and Wyoming in the interest of certain phases of the Bureau's work.

E. W. Shaw, petroleum specialist of the Geological Survey, has returned from a business visit to the Tampico region of Mexico.

The topographical division of the Geological Survey has just completed the Bar Harbor and Mt. Deseret sheets which show the Sieur de Monts National Park. This is the only national park east of the Mississippi River.

D. Foster Hewett, of the U. S. Geological Survey, writes from Peru that he has completed an examination of the vanadium mines at Ragras.

Carl Scholz, president of the American Mining Congress, was host to a party of mining engineers during the recent meeting of the American Institute of Mining Engineers in the Southwest. The trip was made in Mr. Scholz's private car.

J. F. Callbreath left the latter part of September for Denver and Salt Lake, on special work connected with the coming convention of the Mining Congress in November.

F. G. Clapp and C. T. Griswold have recently been engaged in geological examinations in Texas.

G. R. Mansfield, a geologist of the United States Geological Survey, has completed the mapping of the Henry, Cranes Nest, and a part of the Portneuf quadrangles in Idaho.

Frank L. Hess, of the Geological Survey, has returned from South Hampton, N. H., where he was called by the death of his mother.

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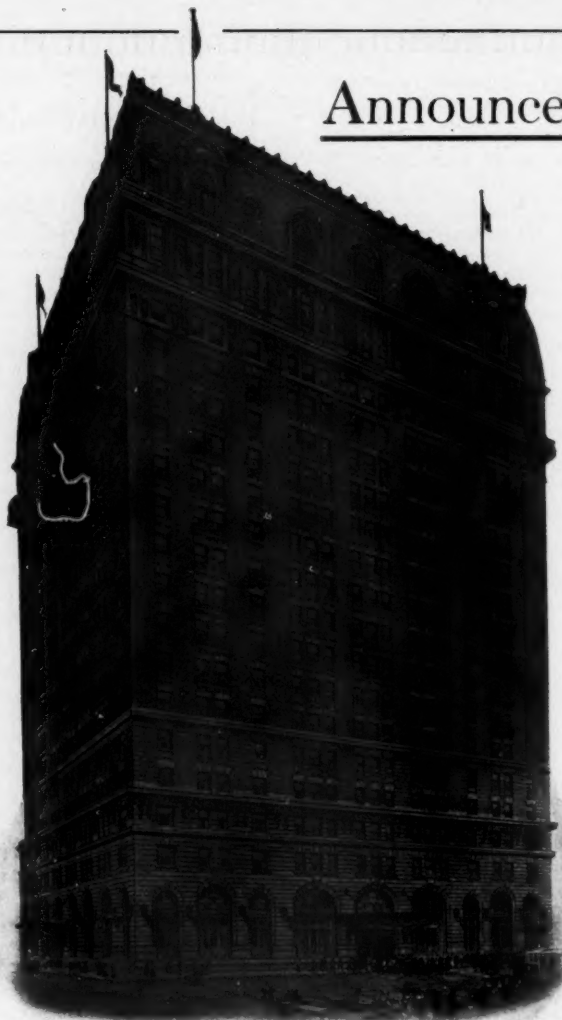
A NOTABLE ISSUE

of the Mining Congress Journal is in the making. In connection with the Annual Convention, November 13-16, the November Number will contain a large amount of additional news matter of important interest to the mining industry.

This issue of the Journal will be sent to every important mine in the United States.

Advertising space can be secured by applying to the Washington or Chicago offices of The American Mining Congress. Washington, Munsey Building; Chicago, Hotel La Salle.

Announcement



Hotel LaSalle, Chicago, in which the American Mining Congress will hold its Nineteenth Annual Convention beginning November 13.

In conjunction with the Nineteenth Annual Convention of the American Mining Congress, Chicago, November 13-16, the entire seventeenth floor of the Hotel LaSalle has been set aside for exhibit purposes.

On this same floor will be several of the section meeting rooms of the convention, and the idea is receiving the hearty support of the mining machinery and supply people.

Among those already having secured space are such firms as The Goodman Manufacturing Company, The Link Belt Company, The General Electric Company, Stromberg-Carlson Mine Telephone Company, Justrite Manufacturing Company, John A. Roebling & Sons, Macomber & Whyte Rope Company, G. L. Simonds Company, Stephens-Adamson, Tool Steel Gear & Pinion Company, etc., etc.

The Convention, which will divide itself into sections, gives promise of being the largest gathering of mining men ever assembled in this country. The deliberations will cover every branch of the mining industry, and assurance is at hand that each branch will be properly represented.

Convention headquarters have been opened at the LaSalle Hotel, Chicago, and applications for exhibit space should be sent to that address.

The
Nineteenth Annual Convention
OF THE
American Mining Congress

LA SALLE HOTEL, CHICAGO, ILLINOIS

NOVEMBER 13, 14, 15, 16, 1916

Chicago by reason of its central location, its spirit of cooperation, its interest in the various branches of mining and its ample hotel accommodations is an ideal location for a great mining convention. The convention will be divided into sectional meetings each devoted to a special branch of mining, thus providing for ample discussion of every important question and the making of comprehensive plans for the benefit of mining. The greatest meeting of mining men ever assembled in this country is practically assured.

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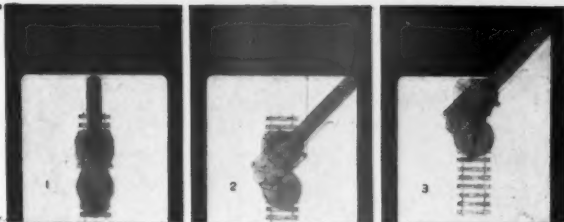
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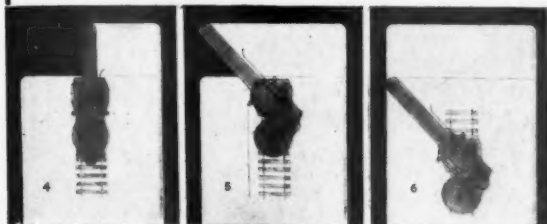
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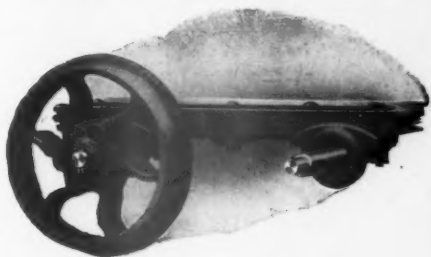
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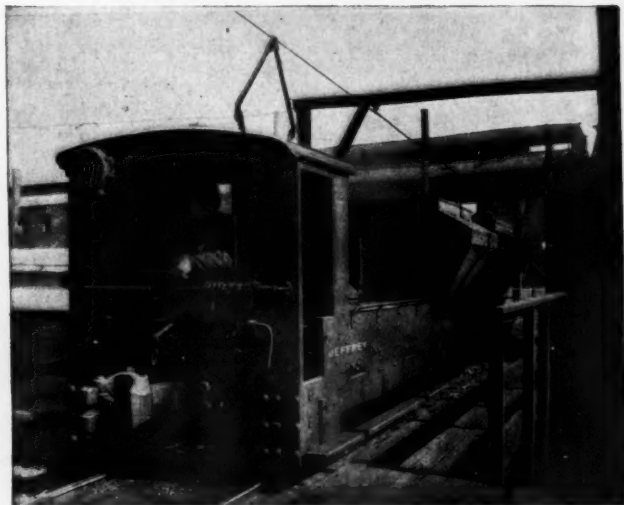
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Drop Bottom Cars permit the material to be dumped directly into hopper furnaces. Motor equipment of the locomotive consists of two 50-Horse Power 250-Volt Commutating Pole Motors. Full load speed is about 6 miles per hour.

Bulletin No. 115-58 has further particulars of this installation, and also illustrates and describes three Jeffrey 18-Ton Electric Locomotives in operation at the Smelting Plant of the United Verde Copper Co., Clarksdale, Arizona, where (27) Jeffrey Locomotives are in successful operation. You will be interested in seeing a copy of this booklet.

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